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# ADULT ABILITIES

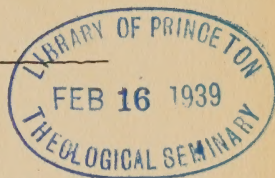
A Study of University Extension Students

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## FOREWORD

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THIS book is the outgrowth of a monograph by the same author published in 1933 under the title *Adult Abilities in Extension Classes*. That monograph dealt with the mental abilities and the classroom achievement of some five thousand adult students who had enrolled in the extension classes of the University of Minnesota. These students came from virtually all walks of life to be found in an urban area, and since most of them were employed, they of necessity attended classes during the evening hours.

The facts and conclusions brought forth by that study were so interesting and carried so much significance for students and leaders of the movement for adult education and for participants therein, that it was deemed expedient to broaden the factual basis of the inquiry. In other words, it became important to ascertain whether the results of the Minnesota study are of merely local application or are of general validity. With the assistance of a Carnegie grant Dr. Sorenson extended the inquiry on the same general lines to six other universities suitably distributed as to geographical area. The results are embodied in the present book.

We need not here go into those results, the data produced and the conclusions derived therefrom. The text speaks for itself. Suffice it to say that on the whole the present study confirms the conclusions of the first study.

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To be sure, there is a certain amount of variability in the six institutions; that was to be expected. But the central core of corroborative evidence stands unimpaired. The conclusions, so far as the scope of this inquiry extends, may be considered fairly well established.

A further word should be said about the scope of this inquiry. It is not a study of adult students in general. It does not purport to be a study of the abilities and characteristics of adults who participate in all the numerous manifestations of present-day adult education. This investigation was limited strictly to adult students enrolled in university extension classes. To what extent the data and conclusions are also applicable to men and women engaged in other kinds of adult education deponent sayeth not. It should also be added that no form of agricultural extension came within the purview of the investigation. We are concerned here with a specific group of adult people selected from the general population both by ability and by the desire to pursue courses of study on the college level.

Adult education is, of course, nothing new. It is probably older than formal education itself. Certainly Socrates and Plato and Aristotle were practicing it on the streets and porticoes of Athens four hundred years before the Christian era, and in the early decades of the first century Jesus of Nazareth too was an exponent of this method of teaching. Yet the term "adult education" did not come into general use until the third decade of the present century. The national movement for organizing



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and unifying all the forces for attack on the general problem became effective in 1926 with the establishment of the American Association for Adult Education. The university extension workers had already in 1915 effected the organization of the National University Extension Association.

We must therefore envisage a large army divided into corps and divisions attacking the problem or problems of adult education in their several manifestations and in their relations to the general social structure. The problems and the areas of attack are found on different social and economic as well as intellectual levels, so that the divisions are both horizontal and vertical. Of this army of attack university extension forms one wing. Its sphere of influence is specific and limited. It appeals only to that part of the general population whose abilities and intelligence are equal to the task of grappling with studies on the college level under the rigorous compulsion of college standards. Others with lower or different aims are left to other divisions specifically organized to serve their purposes. Therefore, university extension students are distinctly not spectacular in numbers. In 1936 they numbered between 200,000 and 300,000. It is probable that in 1938 they reached the latter figure. These students, however, have an importance in the social fabric that far transcends their numbers, for the very obvious reason of their intellectual status. It is with students of this type—and of this type only—as subjects that the present study is concerned.

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Other divisions in the field of adult education may be found in the emergency education program, education in the C. C. C. camps, vocational education, civilian rehabilitation, workers' education, parent education, prison education, and civic education through public forums. This work is carried on by federal and state agencies, the Y.M.C.A. and Y.W.C.A., the Knights of Columbus, workers' colleges, women's clubs, extension divisions of the public schools, and other organizations.

Out of the fund of experience in formulating and administering educational programs for adults there have emerged certain principles which may be said to constitute a basic philosophy for the enterprise. These principles have been summarized as follows in the chapter on Adult Education in the federal commissioner of education's *Biennial Survey of Education, 1934-1936*:

1. Educational opportunities for adults constitute a necessary protective device for a democratic form of government.
2. It is a public responsibility to provide educational opportunities for the study and revision of thought relative to social-economic problems that are occasioned by changing conditions in life situations.
3. Adults are entitled to educational provisions for meeting interests, developed during or furthered by maturity, that accord with general education objectives.
4. Adults are entitled to opportunities in vocational training for upgrading and for increasing their efficiency.
5. It is incumbent upon society to provide educational opportunities that will help adults to use their leisure time wisely.
6. The objectives for classes in adult education will be

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realized in large measure, the motivation of the members being strong.

7. Abilities acquired during adulthood function immediately, thus making for a quick return on the investment.

8. Subject-matter content and instructional procedures for any group should accord with the interests and the methods of learning representative of the group.

9. It is a public responsibility to provide educational opportunities for a large percentage of the population that is interested in and capable of further educational training.

10. There should be educational provisions for adults corresponding to their ability to learn.

These general principles have been found to have specific application to students in university extension classes, as the data and conclusions of this study will demonstrate.

The author of this study, Dr. Herbert Sorenson, now president of the State Teachers College at Duluth, is especially well qualified for the task both by training and by experience. He is a specialist in educational psychology and the author of numerous articles in that field. Moreover, he is the author of a text in statistical method. As a member of the staff of the General Extension Division at the University of Minnesota he taught university extension classes with marked success during a period of ten years. During that time he had the additional advantage of teaching parallel courses to regular campus students. He brought to his task a warm human interest in his students and great powers of observation and analysis. These traits and aptitudes, joined to rigorous

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scientific training and profound belief in the efficacy of adult education, eminently qualify him for just such an investigation as this.

The results of this study should supply a great stimulus to the whole adult education movement, as well as to that segment known as university extension. Many investigators have demonstrated that age of itself can no longer be considered a deterrent to the acquisition of new knowledge or new skills, provided the drive of interest be present. Adults can learn and can retain. The diminution of mental powers with age is very moderate, if those powers be systematically exercised. All these findings are corroborated by the present study and additional facts are educed. When these facts become widely known to the prospective beneficiaries, adult education, including university extension, will become an accepted part of the general educational program.

RICHARD R. PRICE

*Director of University Extension  
University of Minnesota*



IN 1933 a study of the abilities and characteristics of extension students at the University of Minnesota was completed. Mr. Morse A. Cartwright, director of the American Association for Adult Education, suggested that this study be extended to include the extension students of several other representative universities. A generous Carnegie grant to finance the investigation was provided through the efforts of Mr. Cartwright, and a committee consisting of Professors Richard R. Price, chairman, F. Stuart Chapin, Fred Engelhardt, and Donald G. Paterson sponsored the study for the university.

The immediate purpose of the investigation was to determine the abilities and achievements of adults who take university courses offered through the general extension divisions of the universities. The three principal sources for the data constituting the basic core of this project were: the intelligence or general aptitude tests administered to extension students by competent individuals appointed by the extension directors, the results of examinations given to comparable extension and residence classes, and interviews with many extension directors and instructors. The writer spent several months visiting universities and interviewing extension directors and instructors to obtain a background for the study, verify certain points, and gather additional data.

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The data furnished reasonably satisfactory answers to various questions pertaining to the abilities and achievement of extension students. More important, possibly, are the implications of the data, which are especially significant in connection with principles and theories of adult education and its psychology.

Since reporting all of the data in tabular and graphic form would have increased the volume of the book out of all proportion to the value obtained and might have made the details confusing, only the essential and representative materials have been included in that form. Statistical terminology has been avoided as far as possible, and the presentation is largely nontechnical in nature. This has not resulted in any appreciable sacrifice of accuracy or of scientific treatment.

In making this study I have become indebted to many people. Mr. Cartwright not only arranged for a Carnegie grant to finance the investigation, but also made helpful recommendations. Mr. Ralph A. Beals, assistant director of the American Association for Adult Education, read the manuscript and offered some very useful criticisms. I express my gratitude to the extension directors and faculties who provided data and to those who, although unable to provide objective material, cooperated in spirit.

I want to thank particularly the following directors and instructors, who gave aptitude tests to their extension students and collected personal data concerning them: Leon J. Richardson, Boyd B. Rakestraw, and

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I am also grateful to the following individuals for their assistance in providing information on the comparative achievements of extension and residence classes in their universities: Max P. Vosskuhler of the University of Arizona; Elmore Peterson and W. M. Campbell of the University of Colorado; J. C. Wardlaw of the University System of Georgia; W. S. Bittner and R. E. Cavanaugh of Indiana University; Wellington Patrick of the University of Kentucky; P. H. Griffith of Louisiana State University; James A. Moyer of the State Department of Education of Massachusetts; C. A. Fisher and W. D. Henderson of the University of Michigan; the late S. H. Bing of Ohio University; the late T. J. Grayson of the University of Pennsylvania; N. C. Miller of Rutgers University; G. R. Breckenridge of the University of South Dakota; F. C. Lowry of the University of Tennessee; and T. H. Shelby of the University of Texas.

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Several persons contributed to the work of carrying out the investigation and reporting the results. Miss Mellie Phillips took care of many administrative details; Mrs. Bessie Bell aided materially with the statistical and clerical work; and Miss Lucie Lawson worked with the data and helped with the preparation of the manuscript.

Besides these persons mentioned by name, there are many others who were interviewed personally or by letters. Those named, however, were more extensively involved or gave special assistance, and I wish to express my particular indebtedness to them.

HERBERT SORENSON

*Duluth, Minnesota*  
*March, 1938*



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## ADULT ABILITIES

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### CHARACTERISTICS OF EXTENSION STUDENTS

THE classroom activities sponsored by university extension divisions are an important phase of adult education in this country. During the late afternoon and evening thousands of American adults are taking university courses offered through that medium. In many schools the number of such adults is equal to a large percentage of the residence enrollment, and they receive university credit for their courses. But since few studies have been made of extension work, little is known about these students' mental abilities or the quality of their actual classroom achievement. This study is an attempt to learn something about those matters.

#### OBTAINING THE DATA

The directors of all extension divisions were requested to supply data on the relative achievements of extension and nonextension classes comparable in instructor, course of study, examination, and other factors that influence achievement. Several directors were also asked to cooperate in administering aptitude and intelligence tests to their extension students.

Several obstacles are encountered in such attempts

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to test adults. In the first place, most of them do not want to be tested—their attitude is described by the phrase “adult resistance”; second, neither the students nor the instructors in most extension classes want to use class time for tests; and third, directors and instructors are concerned about the effect of a testing program on their class enrollments. Nevertheless, through the cooperation of several extension directors, data on the general mental abilities<sup>1</sup> of extension students were obtained from six universities located in various sections of the United States, and data on the abilities and characteristics of extension students at the University of Minnesota had been obtained previously.<sup>2</sup>

Although not all the extension students of all six institutions were tested, a sampling of the total enrollment of each was examined. It was ascertained that the classwork (as expressed in marks) of the students who took the tests was essentially on a par with the classwork of their colleagues who did not. Furthermore, since the data obtained from the samplings for the various institutions show many of the patterns exhibited in the Minnesota study, which was based on all the Minnesota extension students, it would seem that the samples from the other universities were adequate, and that the students who did not take the test possess approximately the same abilities as those who did.

In each university the test administered to the exten-

<sup>1</sup> For a definition of the term “mental abilities,” see page 32.

<sup>2</sup> The Minnesota study was reported in Herbert Sorenson, *Adult Abilities in Extension Classes* (University of Minnesota Press, 1933).

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sion students was the one that had been given to the full-time students of that institution. Thus the two groups could be compared directly. Instead of giving the same test at every university, however, several tests were used, which resulted in diversified data and made possible a more extensive and differential analysis of the relation of mental ability to age. In one university, where no tests for evaluating abilities had been given to the full-time students, it was necessary to test a group of the nonextension as well as the extension students.

These objective data were supplemented by a background of subjective reactions which the writer got from personal interviews and correspondence with extension directors and instructors. He also used a personal data sheet which the extension students filled in.

In presenting our findings we shall begin with a consideration of certain characteristics of extension students as a group, and in subsequent chapters we shall discuss their college aptitude, their classroom achievement, the problems involved in teaching them, and the relationship of mental ability to age.

### THE AGE OF EXTENSION STUDENTS

*Range and distribution.*—The age of university extension students ranges from the late teens to the seventies and comprises a span of about sixty years. The oldest student found in the course of the writer's investigations was in his late seventies, but there may be an occasional octogenarian.

Data on the ages of extension students are given in

TABLE I.—PERCENTAGE DISTRIBUTION OF EXTENSION STUDENTS OF VARIOUS UNIVERSITIES ACCORDING TO AGE,  
COMPARED WITH AGE DISTRIBUTION OF THE POPULATION OF THE UNITED STATES

Age Group	United States	University A		University B		University C		University D		University E		University F		University G		University H	
		Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
15-19	13.3	30.4	.5	4.0	6.3	8.2	1.3	16.3	16.2	6.1	3.2	37.5	26.4	26.0	28.0	11.9	8.2
20-24	12.6	34.8	18.9	25.1	31.1	22.4	29.4	31.0	24.0	19.9	17.6	34.4	35.2	41.1	38.0	38.0	24.5
25-29	11.3	17.4	28.1	18.6	20.5	16.3	32.5	26.4	18.2	21.8	19.9	16.7	17.6	18.9	18.0	21.9	19.4
30-34	10.5	8.7	15.3	20.1	15.7	12.2	10.4	12.4	9.1	15.3	17.5	4.2	6.4	8.7	6.0	13.1	17.8
35-44	19.8	2.2	25.0	23.1	16.5	28.6	14.7	9.3	21.4	23.5	26.6	6.3	12.8	4.9	8.0	11.8	22.1
45-54	15.0	2.2	10.7	7.0	9.5	6.1	7.4	3.2	8.4	9.4	10.7	1.0	1.6	.4	2.0	2.9	6.9
55-64	9.6	4.3	1.5	2.0	.4	4.1	3.0	1.6	2.6	3.2	3.5	...	...	...	...	.4	1.1
65-74	5.4	...	...	...	...	2.0	1.3	...	...	.4	1.0	...	...	...	...	...	.1
75 and over	2.3	...	...	...	...	...	...	...	...	.2	...	...	...	...	...	...	...
Total ....	99.8	100.0	100.0	99.9	100.0	99.9	100.0	100.2	99.9	99.8	100.0	100.1	100.0	100.0	100.0	100.0	100.1

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Table 1. Most extension students are in their twenties—the decade during which mental powers mature and either reach or approach their zenith. In some universities as many as one-fourth of the total number of extension students are in their teens. In other institutions students of the teen age constitute less than 5 per cent of the total extension class enrollment. The proportion of students in their twenties ranges from 38 to 62 per cent for the institutions included in this study. On the average, individuals between twenty and thirty years of age constitute about one-half of the total.

Comparatively few beyond the age when “life begins” are found in extension classes. In general, only about 15 per cent of the students are over forty years of age. In some universities, however, one-fourth of the students are forty or older, while in others these older students constitute as little as 5 per cent of the total. The number of extension students more than sixty years of age is practically negligible. There are very few or none in some universities; in others 2 to 3 per cent are above sixty. In general, it may be said that the number of students decreases rapidly for the age groups beyond the thirties and that in many instances it diminishes beyond the twenties.

*Sex differences in age.*—In the various universities studied there are no consistent differences in the ages of men and women extension students. There is in most universities, however, a tendency for the women to be slightly older. The average age of the women students



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varies from about twenty-three to thirty-four years, while the average age of the men ranges from twenty-three to thirty-three. Thus, the range of the mean ages is practically the same for both sexes.

In most universities the average age of the men in extension classes is in the later twenties, but for the women the average is in the lower thirties. In two universities the average age of the men is slightly above that of the women. Generally, a larger proportion of men than of women are under forty years of age, the largest difference among the universities being 16 per cent. One of the important causes of this sex difference in the number of older students is the presence of many women school-teachers in extension classes. On the other hand, a larger proportion of men than of women are in their twenties. Among the universities studied the largest difference in the percentages of the two sexes in their twenties is 16 per cent.

*Age of extension students compared with age groups in the population.*—Do extension classes attract adults of all ages in proportion to the ages of the total population? That is, for instance, if 10 per cent of the population are in the fifties, are 10 per cent of the extension students in the fifties? The age compositions of different extension student bodies are not the same. The extension enrollment of some universities contains numerous students who are only in their teens, many of them recent high school graduates who are beginning their college work in university night classes.

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A question might be raised in regard to the fitness of classifying work with these young people as adult education. It is not their youth that causes us to ask this question but rather the nature of their aims in seeking an education. Many of them are taking courses for credit and hope to resume full-time school attendance and eventually receive their degrees. They are as much interested in college credits as the full-time freshman or sophomore. But extension students in their thirties and even in their forties are also often primarily interested in university credit. Thus, it is difficult to determine what is and what is not "adult education" as far as the age and motive factors are concerned.

Every extension department included in this study had more students in their twenties than would be the case if the proportion of this age group attending classes corresponded to its proportion in the total adult population. Although the group in the twenties constitutes slightly less than one-fourth of all individuals over fifteen years of age in the total population, the extension students in this group generally constitute between 40 and 60 per cent of the extension enrollment. Since the average proportion of extension students in their twenties is thus about one-half, they are slightly more than twice as numerous in extension classes as they are in the general population.

After the high point in the twenties, the relative proportion in extension classes decreases. The proportion of extension students in the thirties is about the same

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(sometimes slightly higher or lower) as the proportion of that age group in the general population; but when the forties are reached, the proportion in extension classes is less than in the total population. Approximately one-third of the population over fifteen years of age is above the age of forty-five, but the proportion of extension students above that age ranges from 1 to 15 per cent. Even the university which has the largest proportion of extension students over forty-five attracts less than one-half of the number proportionate to their ratio in the entire population. The universities do not reach the middle-aged and elderly persons, and it might be well for them to increase their interest in the oldest one-third to one-half of the adult population.

The reason that the older adults do not attend universities is not that they lack strong vocational motives but that their interest has not been stimulated. They should be in extension classes because they need education to aid them in making the many adjustments necessary on the journey downward from the crest of life to its end.

It would be a very significant experiment in adult education to prepare broad programs for adults in their forties, fifties, sixties, and seventies. Special projects should be designed for these people, who are educationally speaking "the forgotten men and women." Their education should be recreational, cultural, and informational in nature, rather than vocational. There are many problems about which older adults need guidance and information—for example, those pertaining to health, leisure time, family, and current affairs.

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Furthermore, older people, who have established themselves and have raised their families, have more time for education than young persons with these aims yet to accomplish. They also have the capacity for acquiring knowledge, and, if the teaching is superior, a great interest in it. It is said that older people have exhausted many of the pleasures of life, but this is hardly true in the realm of the intellect. They might well find in education a pathway to new adventures.

### PREVIOUS FORMAL EDUCATION

Since extension divisions accept any adult who desires instruction, there is a wide range in the number of years of formal education extension students have had. In almost every university there are a few who have not finished the eighth grade. There are even occasional individuals who discontinued their education before completing the fourth or fifth grade. At the opposite end of the range are those adults who have had seventeen, eighteen, or nineteen years of formal education. These people are usually members of professions such as the ministry, medicine, engineering, and education; they enroll for an occasional course which they probably expect to be interesting and profitable. Detailed data on the years of schooling are given in Table 2.

The formal education of most extension students lies between these two extremes. Although the average amount varies slightly from university to university, the mode is twelve years of formal education. This means that the largest group of extension students have gradu-

TABLE 2.—PERCENTAGE DISTRIBUTION OF EXTENSION STUDENTS  
IN VARIOUS UNIVERSITIES ACCORDING TO YEARS OF SCHOOLING

Years of Schooling	University A		University B		University C		University D		University E		University F		University G		University H	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
6 or less..	...	...	...	...	...	...	...	.6	1.1	.3	...	...	...	...	1.3	.2
7 .....	...	...	.5	...	...	...	...	...	1.6	.4	...	...	.4	...	.7	.2
8 .....	...	...	4.5	.8	4.0	...	...	.6	5.1	3.1	...	...	2.3	...	5.4	1.1
9 .....	6.5	1.0	4.0	1.9	...	...	1.6	.6	3.5	2.3	...	...	2.8	1.9	3.7	1.2
10 .....	4.3	.5	9.0	1.5	4.0	...	.8	1.3	4.7	4.6	...	...	6.4	3.8	6.1	2.6
11 .....	10.9	1.9	5.0	2.3	2.0	.4	.8	1.9	4.2	3.9	...	...	5.7	1.9	5.6	2.9
12 .....	41.3	12.5	27.6	22.6	22.0	7.5	26.6	28.9	24.2	20.2	67.0	55.1	52.4	61.5	34.1	23.7
13 .....	10.9	17.8	7.0	8.3	12.0	8.6	9.4	13.8	9.5	10.1	12.3	15.9	11.0	13.5	10.5	11.2
14 .....	6.5	31.7	15.1	27.5	28.0	47.4	14.1	20.1	12.7	17.7	8.5	11.6	8.5	9.6	11.0	26.2
15 .....	6.5	15.4	9.5	17.7	12.0	23.1	7.0	15.7	6.9	10.3	4.7	4.3	2.8	...	7.2	16.1
16 .....	4.3	13.9	12.6	13.6	6.0	5.2	25.0	10.1	16.0	14.9	4.7	8.0	4.7	3.8	8.4	10.4
17 .....	2.2	3.8	3.0	2.3	8.0	4.9	10.2	3.1	5.6	7.9	1.9	.7	1.7	1.9	2.6	2.8
18 .....	6.5	1.4	1.0	1.5	2.0	3.0	3.9	3.1	1.8	3.1	.9	1.4	1.3	1.9	1.9	1.1
19 .....	...	...	1.0	...	...	...	...	...	2.4	.9	...	...	...	...	1.3	.4
20 .....	...	...	...	...	...	...	...	...	.7	.4	...	...	...	...	...	...
Total ...	99.9	99.9	99.8	100.0	100.0	100.1	100.2	99.8	100.0	100.1	100.0	99.8	100.0	99.8	99.8	100.1



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ated from high school and are either beginning their college work through extension or are taking courses beyond the high school level without the intention of later matriculating in the university for full-time work. Many of the students with twelve years of schooling are stenographers, salesmen, and clerks in various industries.

The next largest group of students are those with fourteen years of formal education, which represents graduation from a normal school or junior college or the completion of the first two years of college. Many extension students in this group are elementary-school teachers. In those universities where the principal purpose of extension classwork is the further training of employed teachers, the students usually have had twelve or thirteen years of schooling and many have had fourteen, fifteen, or sixteen years. In one university which offers special graduate courses by extension, a considerable number of college graduates are taking extension work.

The amount of formal education which the members of extension classes have had varies according to the courses offered. If a university is situated in a small community and the extension courses are limited to those that appeal almost exclusively to teachers, few adults with less education than that of the teachers will enroll for extension classes. On the other hand, universities in the larger centers attract many people with little education, because such universities are able to provide more courses and also because there is naturally a greater response in the larger communities.

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As we shall see in the discussion of the relation between ability and amount of education,<sup>3</sup> the number of years of formal education which students have had is a general index to their ability to profit from instruction and do satisfactory university work. Most extension students have had sufficient formal education to qualify for university work. There are some adults with little formal education who have unusually high native aptitude and can thus compete successfully with others who have had much more formal education.

### VOCATIONAL STATUS

An examination of the vocational status of extension students gives us information on two especially important matters: first, the abilities and interests of extension students; and second, the degree to which extension work is reaching the general population. The detailed data on the vocational status of extension students may be found in Table 3.

The vocational pattern of extension students is very clear. The two main occupational groups are the public-school teachers and the men and women from business offices. The majority of the former are elementary-school teachers who are either required to earn university credit to maintain their certificates or are aspiring to a university degree in order to qualify for larger salaries. The percentage of schoolteachers in the total extension enrollment varies from one university to another. Generally, teachers constitute about 30 to 50 per cent of the total

<sup>3</sup> See pages 48-55.

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enrollment. In one institution over 90 per cent of the extension students were teachers.

The other main occupational group, men and women from business offices, includes stenographers, bank clerks, store clerks, accountants, and salesmen. These people from the store, the bank, and the office have the same motive and objective as the schoolteachers; they want training that will enable them to obtain larger salaries and greater security in their positions. The business or commercial group constitutes, on the average, about 30 to 40 per cent of the total number of extension students. This number, too, varies in different universities, but these percentages are representative. There is comparatively little variation in the proportion of stenographers or typists, but great variation in that of clerks and other business employees.

One extension division attracts an unusually large number of engineers, and several attract nurses and librarians; but in general the number of such students is comparatively small. It should be mentioned here that some universities conduct special short courses, not included in the usual extension classwork, for members of the professions—especially dentists and physicians.

The full-time residence students enrolled for extension classes in certain institutions should be listed here, too. An appreciable amount of subfreshman or deficiency work is offered by some extension divisions. Sometimes housewives attend extension classes; in one institution they constitute one-tenth of the total extension enroll-

TABLE 3.—PERCENTAGE DISTRIBUTION OF EXTENSION STUDENTS IN VARIOUS UNIVERSITIES  
ACCORDING TO OCCUPATIONAL RANKING

Occupational Ranking	University A		University B		University C		University D		University E		University F		University G		University H	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Housewives .....	...	3.4	...	7.5	...	1.2	...	13.4	...	12.9	...	3.0	...	5.8	...	4.9
Students .....	...	2.9	...	9.9	...	.4	3.4	2.7	5.0	3.5	20.6	18.8	.4	...	5.1	3.9
Unemployed .....	7.9	1.5	2.2	1.2	2.0	.8	10.2	14.1	3.1	2.7	1.5	...	12.5	7.7	...	...
Seamen, marines .....	7.9	...	...	...	...	...	...	...	.5	...	...	...	...	...	...	...
Professional: lawyers, engineers, doctors..	...	.5	2.2	.8	2.0	.4	30.5	2.0	10.8	1.9	4.4	2.0	3.3	3.8	5.1	.6
Teachers .....	23.7	79.9	22.7	51.6	83.7	94.9	19.5	38.9	11.5	30.9	4.4	16.8	.7	3.8	4.5	40.9
Nurses, pharmacists, librarians, etc. ....	2.6	2.0	...	6.7	...	1.6	4.2	6.0	2.4	15.1	5.9	19.8	3.9	9.6	3.1	10.4
Managers, manufactur- ing superintend- ents, accountants, bankers, etc. ....	2.6	1.0	9.2	.4	...	...	2.5	2.0	13.2	3.2	4.4	...	5.3	...	12.8	1.6
Draftsmen, retail dealers, etc. ....	5.3	...	1.1	.4	2.0	...	5.9	.7	11.8	1.7	5.9	2.0	6.6	1.9	9.5	1.1

TABLE 3.—Continued

Occupational Ranking	University A		University B		University C		University D		University E		University F		University G		University H	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Sales agents, book-keepers, etc. ....	...	1.0	6.5	2.0	...	.4	1.7	7.4	10.3	2.5	8.8	4.0	8.1	23.1	11.4	6.0
Stenographers, typists ...	...	4.4	2.7	13.1	...	.4	...	8.7	.7	7.2	...	15.8	.4	19.2	4.0	21.5
Public service .....	...	2.0	...	...	...	...	1.7	.7	3.8	12.5	2.9	6.9	.9	1.9	3.4	2.8
Conductors, clerks in stores .....	5.3	...	3.8	1.2	2.0	...	4.2	...	10.1	.2	2.9	1.0	18.4	3.8	11.0	.5
Clerks not in stores, etc. ....	21.1	1.0	43.8	3.6	...	...	2.5	1.3	9.9	3.0	25.0	8.9	17.5	7.7	17.0	4.4
Mail carriers, farmers, painters, etc....	2.6	...	1.6	...	4.1	...	3.4	1.3	4.6	1.4	2.9	1.0	6.3	1.9	5.8	.6
Plasterers, chauffeurs, tailors, etc. ....	13.2	...	1.1	...	2.0	...	2.5	.7	.5	.7	2.9	...	4.6	5.8	2.7	.2
Firemen, laborers, waitresses .....	7.9	.5	3.2	1.6	2.0	...	7.6	...	1.7	.6	7.4	...	5.5	3.8	4.6	.6



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ment. Usually, too, there are a few unemployed individuals who undoubtedly expect to become better equipped through college study for the positions they hope to obtain.

But, on the whole, if the extension students who come from the teaching profession and the business and commercial world were eliminated, there would be relatively few remaining, for members of other professions are seldom attracted to extension classwork. And the groups that constitute the majority of adult workers are scarcely touched by extension classes. For example, the many workers employed in the trades—the carpenters, printers, firemen, painters, railroaders, mail carriers, etc.—are only slightly represented in the enrollment of extension classes.

It should be noted in this connection that members of the professions and those occupied in clerical work constitute only 15 per cent of all workers. Thus, nearly 85 per cent of the adults—those engaged in agriculture, manufacturing and mechanical industries, transportation and communication, domestic and personal service, etc.—are left virtually untouched by extension classes. In general, then, extension divisions specialize in the training of teachers and persons engaged in business. Since there are much larger groups of the population that such classes scarcely reach, extension divisions cannot claim that they are bringing education to the people. Certain limited groups are served, but the large mass of adults is not touched.

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### FAMILY RELATIONSHIPS IN VOCATIONAL STATUS AND YEARS OF SCHOOLING

*Paternal occupations.*—Next let us examine certain social factors relevant to the selection of extension students. First of all, the occupational status of the students themselves may be compared with that of their fathers. Vocationally, the students are distributed more toward the professional end of the vocational scale than are their fathers, though the ratio is not very large—about one and a half to one. The fathers, in turn, are not distributed throughout the occupations in the proportion that all employed men are distributed. They are closer to that distribution than are their children, but the number of them engaged in the more favorable occupations is greater than the number of the employed population as a whole in such occupations. The detailed data on this subject are not presented in tabular form.

The typical full-time university student does not represent the occupational composition of society. The great majority of people are “workers” in the usual sense, while the largest proportion of university students do not come from the homes of people thus classified but are the children of professional men, storekeepers, bankers, manufacturers, etc. Relatively few children of those who live “on the other side of the tracks” are found in the university. The proportion of farmers’ sons and daughters in college is far less than the proportion of farmers in the total population—a condition that likewise exists in several other occupational groups.

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The mental ability of children is somewhat related to the occupational status of their parents, but that relationship is not enough to account for the occupational grouping of college students. In fact, the selection of high school graduates by colleges does not follow mental capacity as closely as might be expected. The proportion of high school graduates of low capacity who attend college is surprisingly large. This fact indicates that the economic factor is important in determining which high school graduates go to college. Thus, many worthy and capable students do not reach college, while many unworthy students are sent simply because their parents can afford it.

Extension divisions select from the strata of the less privileged to a greater extent than do the colleges of a university. Thus, extension education is more democratic than the so-called "regular" university work. Because there is a relationship between vocations and ability, it must be recognized of course that no form of higher education can attract representative proportions from all vocational groups. Yet, if we could discover a way to draw greater numbers of the capable from the less favored but more populous vocations, higher education would reach a more representative sample of the American people. At present, our higher education, both extension and residence, serves principally the more favored economic groups.

*Schooling of extension students according to the occupations of their fathers.*—For the population as a whole,

## CHARACTERISTICS OF STUDENTS

there is a relationship between the number of years of education people have had and the vocational status of their fathers. Children whose fathers are engaged in the more menial occupations generally obtain the least education, and children of parents in more remunerative occupations obtain the most education.

For extension students, however, this relationship, if it exists at all, is very slight. This fact can be verified by examining Table 4. Extension students are a selected group and almost as many of them come from families on the so-called lower occupational levels as from those on the upper. Thus, little relationship is apparent between the amount of education extension students have had and their parents' occupational status. Such a trend is perhaps desirable, for it seems to indicate that extension education is making a wide appeal to the less privileged groups. Still, it must be remembered that people in the less favored occupations far outnumber those in the professions and comparable occupations. The extension students whose parents' socio-economic status is low are much better selected than those whose parents' status is high. Consequently, the amount of education of extension students shows no relationship to the socio-economic status of their parents.

*Schooling of extension students compared with that of their parents.*—There is very little correlation between the educational status of parents and that of their children. Extension students with relatively unschooled parents have had on the average as much education as those

TABLE 4.—EXTENSION STUDENTS' YEARS OF SCHOOLING (MEAN)  
ACCORDING TO OCCUPATIONAL RANKING OF THEIR FATHERS

Occupational Ranking of Father	University A		University B		University C		University D		University E		University F		University G	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Unemployed .....	...	...	11.5	...	...	14.0	...	13.0	15.0	10.0	11.6	...	13.1	13.5
Retired .....	...	...	13.0	14.0	12.0	14.1	...	14.8	14.0	14.4	12.8	...	...	...
Dead .....	...	...	12.3	13.2	11.0	14.4	13.7	15.0	13.7	13.8	12.0	13.0	...	...
Captain .....	...	16.0	...	...	...	...	...	...	...	10.3	...	...	...	...
Seamen .....	12.0	16.0	...	...	...	...	...	...	15.0	15.0	12.0	...	...	...
Professional: lawyers, engineers, doctors ...	13.3	15.0	13.3	14.1	14.0	13.9	15.2	14.0	14.3	14.9	13.0	...	14.0	14.3
Teachers .....	17.0	14.8	13.4	14.3	13.0	14.4	14.5	13.8	15.3	14.0	13.3	...	13.3	14.3
Pharmacists, librarians, etc. ....	15.5	14.0	14.7	12.8	...	...	15.0	14.5	13.3	14.9	12.7	...	13.0	13.9
Managers, manufactur- ing superintendents, accountants, bank- ers, etc. ....	11.3	14.7	14.2	14.4	14.8	14.3	13.4	15.3	13.3	13.7	13.0	12.3	13.1	13.9



TABLE 4.—Continued

Occupational Ranking of Father	University A		University B		University C		University D		University E		University F		University G	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Draftsmen, retail dealers, etc. ....	13.6	14.0	12.3	14.1	13.5	14.6	13.8	14.6	13.3	14.2	12.6	13.6	13.0	13.8
Sales agents, book- keepers, etc. ....	12.0	14.2	14.3	14.0	13.0	14.8	13.8	13.7	13.7	13.8	12.3	12.0	12.5	13.4
Stenographers, typists..	...	...	9.0	...	...	...	...	...	...	...	...	...	13.4	13.0
Public service .....	...	15.0	12.0	14.0	11.5	14.0	14.0	15.0	13.5	13.8	...	...	12.2	12.9
Conductors, clerks in stores .....	12.4	14.3	12.2	13.9	14.5	14.4	14.6	12.9	12.5	13.3	12.2	12.5	12.5	13.3
Clerks not in stores, etc. ....	11.0	14.3	11.7	11.8	...	14.0	12.0	13.3	13.1	13.5	12.4	...	12.3	13.3
Mail carriers, farmers, painters, etc. ....	12.9	13.6	13.3	13.5	13.5	14.3	14.6	13.5	13.3	13.1	12.3	12.6	12.6	13.6
Plasterers, chauffeurs, tailors, etc. ....	12.0	13.0	12.1	12.8	12.5	14.7	13.4	12.9	12.2	12.2	11.8	13.0	12.4	13.0
Firemen, laborers, waiters, etc. ....	...	14.0	10.7	13.7	14.5	14.1	13.0	12.6	12.0	12.9	11.9	12.0	11.8	13.2

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whose parents are college graduates. This fact indicates again that the selection from the less educated and possibly less endowed strata of society is proportionately less than the selection from the more favored elements. In this respect, selection in extension classes operates in a fashion very similar to that in day classes, though taking slightly more from the lower strata.

*Schooling of extension students compared with that of their brothers and sisters.*—Is the extension student more highly selected than his brothers and sisters? Is he the educationally privileged or underprivileged of his family? The data, which are not presented in detail, indicate that in general he is neither. If the extension student has had very little formal education, his brothers will probably have had slightly more. This is to be expected, since values which are compared with the lowest extreme are generally relatively high; statistically, this trend is called regression. Likewise, those extension students with the most education have brothers and sisters with slightly less. This fact, too, may be expected and represents regression from the upper extreme.

These facts concerning the education of extension students and of the other members of their families indicate that extension education serves neither the individual who has failed to meet the family standards of education nor the one who has exceeded it. In general, the extension student is comparable to his brothers and sisters in the extent to which he has availed himself of his educational opportunities.

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### THE MOTIVES OF EXTENSION STUDENTS

What motivates adults to attend classes? Do they seek recreation, culture, or better vocational qualifications? This investigation indicates that a large majority of them have vocational motives. They usually desire one of two things, advancement in their present positions or preparation for different ones. The ratio of these two vocational motives in the order given is about seven to one for the men and twelve to one for the women, which suggests that women are more stable vocationally than are men. About 80 per cent of the men and 70 per cent of the women have vocational motives. The detailed data are given in Table 5.

The percentage of extension students with vocational incentives varies in the different universities, the lowest being 50 per cent and the highest 84 per cent. Although these percentages seem high, there are probably even more individuals with vocational motives among the younger full-time students. It is conceivable that almost all students attend college with a view to the improvement of their vocational status—for which they cannot be criticized; it is entirely natural that young people should seek security in life.

Other adults enroll for extension courses because they are motivated by intellectual curiosity and a desire for cultural development; still others because they prefer to devote their leisure time to class attendance. Nearly one-fourth of all extension students are motivated by cultural or leisure-time interests. Of course, the proportion

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TABLE 5.—PERCENTAGE DISTRIBUTION OF EXTENSION STUDENTS  
ACCORDING TO SPECIFIED REASONS FOR ATTENDING UNIVERSITY CLASSES

	Reasons for University Study				
	Advance- ment in one's work	Preparation for a dif- ferent job	Cultural or social reasons	Use of lei- sure, gener- al interest	Miscel- laneous
University A					
Men.....	71.4	11.9	2.4	9.5	4.8
Women.....	74.1	2.6	7.3	7.8	8.3
University B					
Men.....	76.1	4.9	6.0	11.4	1.6
Women.....	60.9	1.6	12.3	18.9	6.2
University C					
Men.....	71.1	8.9	2.2	2.2	15.6
Women.....	82.2	...	6.2	5.0	6.6
University D					
Men.....	76.9	6.6	4.1	8.3	4.1
Women.....	54.5	10.9	7.7	22.4	4.5
University E					
Men.....	57.6	10.7	11.6	13.5	6.6
Women.....	43.5	5.7	20.2	26.7	4.0
University F					
Men.....	69.3	15.2	4.5	6.6	4.4
Women.....	60.6	6.2	14.2	14.8	4.1

varies in the different universities and ranges from slightly more than 10 per cent in one institution to almost 50 per cent in another.

There is a noticeable sex difference in the motivation of extension students. Although this difference is not consistent in the various universities, on the average approximately 15 per cent of the men and 30 per cent of the women have nonvocational motives. In one institution where the vocational motive is not so dominant as in others, there are twice as many women as men with nonvocational objectives. Special short courses in litera-

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ture and art may be responsible for this situation. On the other hand, in universities whose extension enrollment consists largely of public-school teachers, there are only a few students with nonvocational incentives. Furthermore, in such institutions, the percentage of women who are interested in nonvocational self-development is only slightly larger than the percentage of men with such objectives. In general, however, more women than men have nonvocational objectives.

A feature of extension education which cannot be overlooked is the fact that many adults are motivated by a desire and need for university credits. In certain states the credit-hunting motive is especially prevalent among teachers as a direct result of the law which requires them to earn certain credits in order to maintain their teacher's certificate. In some schools a teacher's classification in the salary scale is determined by the number of academic credits she has earned.

Although on the whole there is now a more desirable attitude than previously among teachers enrolled in extension classes,<sup>4</sup> it must be recognized that the credit-hunting motive remains an objectionable influence on the adult attitude toward extension courses. When the schoolteacher is dominated by the desire to secure credit, training and education are often incidental.

Other groups may become credit-hunters in the future, especially if regulations necessitate more training in other professional classes. For example, there may be a

<sup>4</sup> See pages 88-89.

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large permanent army of social workers of whom additional and continuous training will be required. Nursing education may be put on a higher plane and extended training required of all nurses. It is the opinion of many who train physicians and surgeons that scarcely one of them is well prepared to practice when he graduates, and under the present system of education, we can only hope that they acquire proficiency with a minimum number of accidents. Furthermore, those physicians and surgeons who have been practicing for many years are rarely familiar with the latest developments in their fields; in fact, the methods of many of them have actually been outmoded. A similar situation exists in the dental profession. It seems likely that physicians, surgeons, and dentists may soon be required to return periodically to the classroom and laboratory for additional knowledge and better methods. Will the members of these professions then become credit-hunters and timeservers, or will they seek improved techniques and further knowledge?

While there is no appreciable relation between age and educational incentives, there is a tendency for fewer of the older students to have vocational motives than the younger—a not unnatural fact, for it is to be expected that the vocational objectives of older students will not be as acute as those of the younger students.

The comparative ability of the individuals with vocational and those with nonvocational interests and motives is of considerable interest. Which group tends to have the higher ability? Those with nonvocational objec-



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tives possess the highest aptitude for college work. The difference in favor of the students with cultural and leisure-time objectives is not large and not extremely important instructionally, but it does suggest that the more capable are impelled by general interest to seek education.

Extension students who are not working for degrees or certificates tend to have slightly higher abilities than those who are, a fact that is consistent with the tendency of adults having nonvocational purposes to be more able. The same individuals often belong to both nonvocational and nondegree groups, however, and this may account for the corresponding trends.

The group without degree and vocational motives should be increased, for it is composed of persons who tend to have more capacity and whose interests are not stunted by overspecialization. With such individuals, the university could build up a program of real adult education and make a special appeal to men and women for whom scholarship would be the chief interest. They could attract into special classes and seminars mature adults of high intellectual powers who would be willing to study intensively and become true scholars. Such adults should be aided by the finest teachers of the university and given access to its best laboratory and library facilities. Under such a program, individuals who have the leisure time could train themselves to be experts on tax questions, health and school problems, and many other civic affairs. Educated adults working on the basis

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of truth and fact rather than of fragmentary knowledge and political emotion would be a dependable progressive force. They could become an invaluable asset to any community.

### SUMMARY

From the facts presented in this chapter, it may be concluded that the extension student is well selected. His own socio-economic station is satisfactory and he represents a good selection from the economic, educational, and social groups in which his parents are found. His own occupational status is usually favorable, and he has had, on the average, some college education.

From another point of view, the adult education conducted by universities through their extension divisions results in too high a selection. It is doing for adults in some measure what campus education is doing for younger students. Usually the more privileged adults receive the advantages of higher education. Such a process is consistent only with the educational philosophy that the fruits of a university can be assimilated best by those who are socially and economically most favored.

General extension divisions purport, however, to bring the university to the people. If this purpose or claim is to be satisfied, it is essential that the appeal be made to the people as a whole instead of to a selected few. In other words, the extension student is too well selected, which is highly desirable according to narrow academic standards but not according to the broader philosophy of adult education.

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It is recognized that the students about whom data for this study have been obtained are, to a great extent, credit students. This means that they have been well selected for doing satisfactory university work, because students who are better prepared will take credit courses. Yet the university should reach people of all educational, occupational, and age levels. If this cannot be accomplished through formal credit classes, it should be done through informal noncredit work.

### THE MENTAL ABILITIES OF EXTENSION STUDENTS

BEFORE we discuss the fitness of extension students for college work, it may be well to make clear our use of certain words. The term "mental abilities" is used here to mean the abilities measured by the tests given to the extension and residence students, that is, mental abilities as measured by aptitude tests. Such abilities are considered equivalent to academic or logical intelligence, which should be distinguished from social intelligence or motor capacity.

And to clarify our distinction between *capacity* and *ability*: Ability, psychologically speaking, means skill, knowledge, and performance. Capacity, on the other hand, is the power to develop such ability.

#### COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS

As a means of setting forth the comparative abilities of extension and nonextension students, we present for each university studied one or more figures showing the data in graphic form to supplement the text description of the findings.

*University A.*—In this institution the American Coun-

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cil Test was used to determine the abilities of extension students, because it had also been employed to test the abilities of the freshmen. Of the two percentile curves

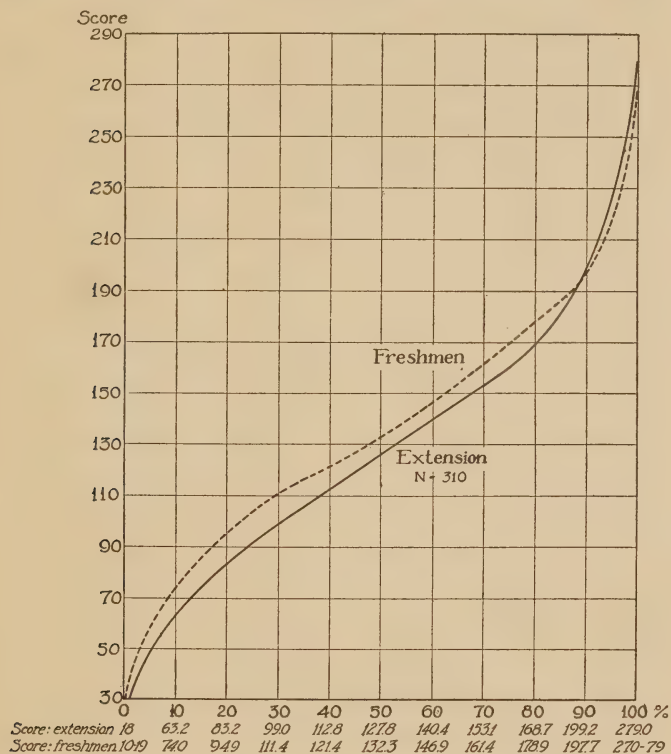


FIGURE I.—COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS IN UNIVERSITY A

shown in Figure 1, the broken line represents the distribution of scores for the freshman students and the solid curve the distribution of extension scores. Comparing the

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curves shows that the scores of freshmen are on the whole higher than those of extension students. The superiority of the lower 30 or 40 per cent of the freshman group over a corresponding section of the extension students is greatest, but the differences between freshmen and adults in the average and higher groups are less. The relationship changes, as is shown by the crossing of the lines at about the eighty-eighth percentile, which indicates that the best 12 per cent of the extension students are better than the best 12 per cent of the freshmen.

The differences between the scores of the respective groups are not large. In fact, at no point in the distributions is the difference as large as 10 per cent; it is only about 5 per cent near the averages of the two groups. If 5 to 10 per cent of the poorest extension students were excluded, the curve for the remaining extension students would be slightly above the curve for freshmen. But although the differences are not large statistically, there may be a question whether or not they are significant from the instructional standpoint. Can the freshmen learn with greater facility, and are they likely to become better educated than the extension students?

If all factors except measured ability were equal, the freshman group of this institution would probably be composed of slightly better students on the average than a similar group of extension students. The range of ability is approximately equal for both groups. Students whose scores are represented by the upper portions of both curves are very superior in capacity to those whose scores



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are found in the lower parts. Consequently, if an instructor has an extension class consisting of superior students and a residence class composed of inferior students, he is likely to regard extension students as very superior; and of course, with the selection reversed he will be of the opposite opinion. The range of ability is so wide, in fact, that just such pronounced differences do exist between residence and extension classes. Similarly, there are likely to be significant differences in the abilities of the members within any given class. In general, on the basis of these tests and the evidence collected on comparative achievement,<sup>1</sup> it may be said that there is no educationally important difference in ability between extension and residence students.

*University B.*—The data for the other universities will not be discussed in such detail as for University A. The two percentile curves in Figure 2 indicate the distribution of scores for residence and extension students on the Ohio State University Psychological Test. The broken line represents the scores of matriculating freshmen and the solid line the scores of extension students. At no point are they widely divergent, and at the upper end they converge. The difference between the best and the poorest of each group is very much greater than the difference between the averages of the two groups.

The test administered to the extension and residence students of this university had also been given to the students of other universities. From the scores obtained

<sup>1</sup> For the findings on achievement, see Chapter Three.

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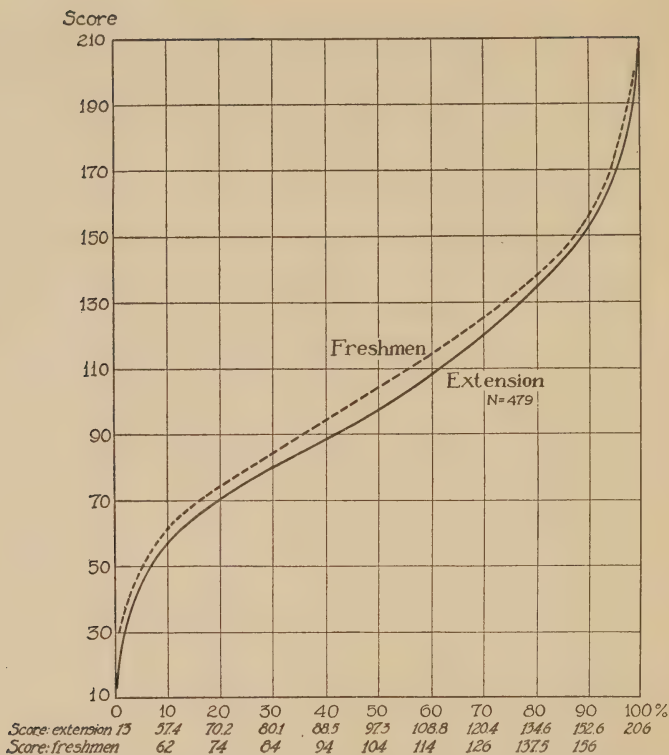


FIGURE 2.—COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS IN UNIVERSITY B

it is evident that the abilities of both extension and non-extension students at this university are high in comparison with those of the students in some other institutions.

*University C.*—In this institution the Kentucky Classification Test was used. The scores of extension students tend to be higher than those of freshmen (Figure 3).

# MENTAL ABILITIES

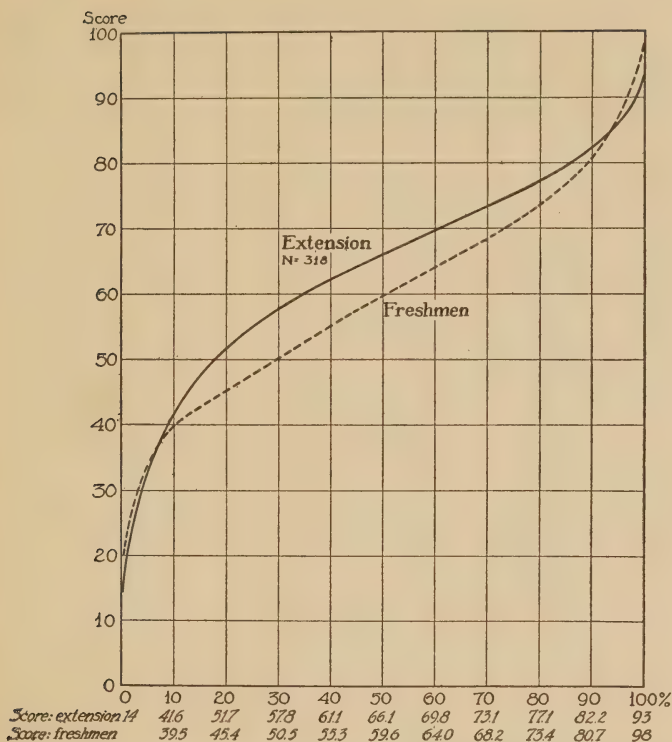


FIGURE 3.—COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS IN UNIVERSITY C

The largest difference is about 12 per cent, and throughout much of the distribution the differences are at least 10 per cent. Yet here again, the differences among the individual students in each group are much greater and more important than the average difference between the groups.

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*University D.*—The American Council Test was used in this institution, and again the scores of the extension students are higher on the average than the scores of

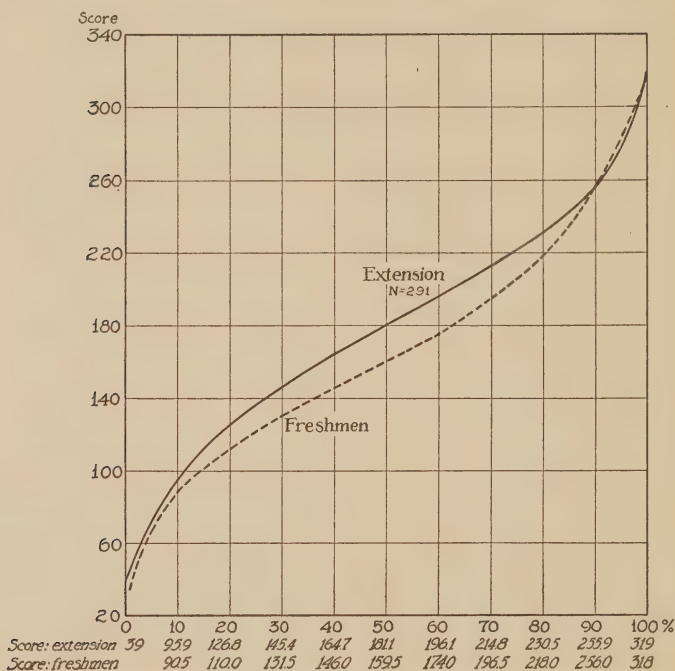


FIGURE 4.—COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS IN UNIVERSITY D

students entering the college of arts and sciences (Figure 4). The largest differences are about 13 per cent. The highest 10 per cents of the scores for both groups are essentially equal, as are the lowest 10 per cents. The frequent similarities of the extreme scores are very notice-

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able in contrast to the differences throughout the central portions of the distributions.

The fact that the superior individuals of both groups are approximately equal indicates that the superior students in each group apparently reach the "ceiling" or "top" of the test. Since the superior freshmen as well as the best of the more mature extension students reach the "top," it would seem that freshmen have reached mental maturity. But there may be a rather negligible growth in the abilities measured by intelligence tests after the first college year. The growth may also be differential in nature—that is, some abilities may increase slightly while others may not.

If greater maturity and experience contribute to scholarship, the best extension students are probably superior to the best freshmen. If, on the other hand, greater maturity hinders scholarship, the freshmen are better students. Basing their opinions on experience, instructors believe that the best extension students are superior to the best undergraduate students.

*University E.*—Since aptitude tests had not been administered to the matriculating students in this institution, the freshmen entering in the spring quarter were tested. Although the spring-quarter group is not large, the students are probably equal in ability to the freshmen who matriculate during other quarters. The Minnesota Reading Examination, Form A, was used. Since this test contains both vocabulary and reading tests, it made possible two very interesting comparisons; there was

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an opportunity to observe a variation in the differences between two groups in two abilities.

Results of the analysis (Figure 5) indicate that the

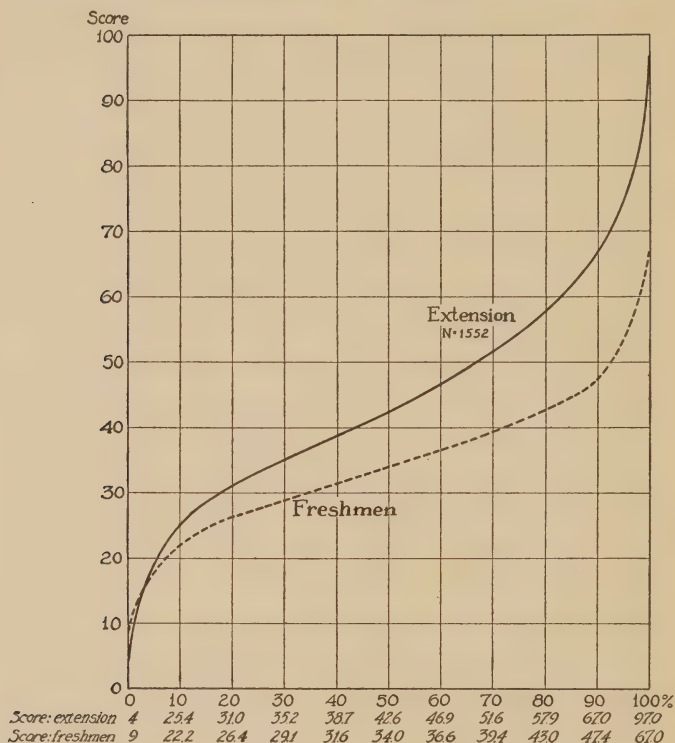


FIGURE 5.—COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS IN UNIVERSITY E (VOCABULARY TEST).

extension students have larger vocabularies than the freshmen. The greatest difference between the scores of the two groups is 30 per cent, which is the widest difference of any kind found in this investigation. In this in-



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stance the highest 10 per cents are very dissimilar and the lowest 10 per cents are much alike. If a larger group of freshmen had been tested—the group entering in the fall, for example—some higher vocabulary scores might have been obtained. It is unlikely, however, that any freshmen would have made vocabulary scores equal to the highest scores of extension students.

The curves representing paragraph-reading ability (Figure 6) show a relationship noticeably different from those for vocabulary. The vocabulary curves are very close at the beginning and cross in the first tenth of the distribution. The curves for paragraph-reading ability, however, indicate that the lower half of the freshmen are superior to the lower half of the extension students. This superiority is reflected in the vocabulary curves, which show a greater difference at their upper ends than elsewhere. If the vocabulary curve for freshmen were moved up approximately half an inch, the relative position of the vocabulary curves would be very similar to that of the curves for paragraph reading.

A comparison of the curves representing the two abilities indicates that the younger full-time students have either more power or more training to discover the meaning in paragraphs than have the older extension students, although the latter possess larger vocabularies, and that paragraph-reading ability does not increase with age as does vocabulary. The data obtained in the study of other extension students show a similar relationship between vocabulary and reading ability.

*University F.*—In this particular university we had an

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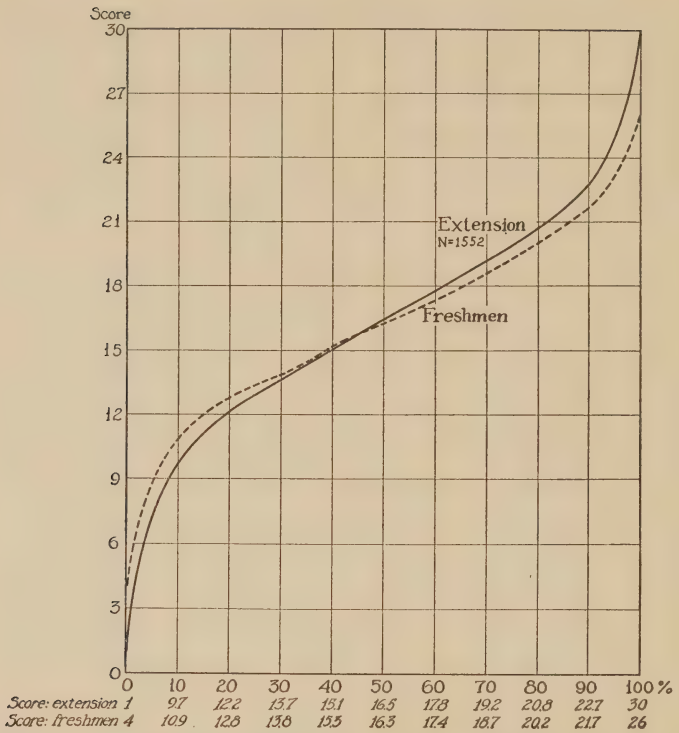


FIGURE 6.—COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS IN UNIVERSITY E (PARAGRAPH-READING TEST)

opportunity to compare the measured ability of extension students with the abilities of both freshmen and upperclassmen.<sup>2</sup> The American Council Test was used. According to the scores (Figure 7), the freshmen are least capable and the upperclassmen have more capacity than either the freshmen or extension students. The extension

<sup>2</sup> The upperclassmen included all students other than freshmen.

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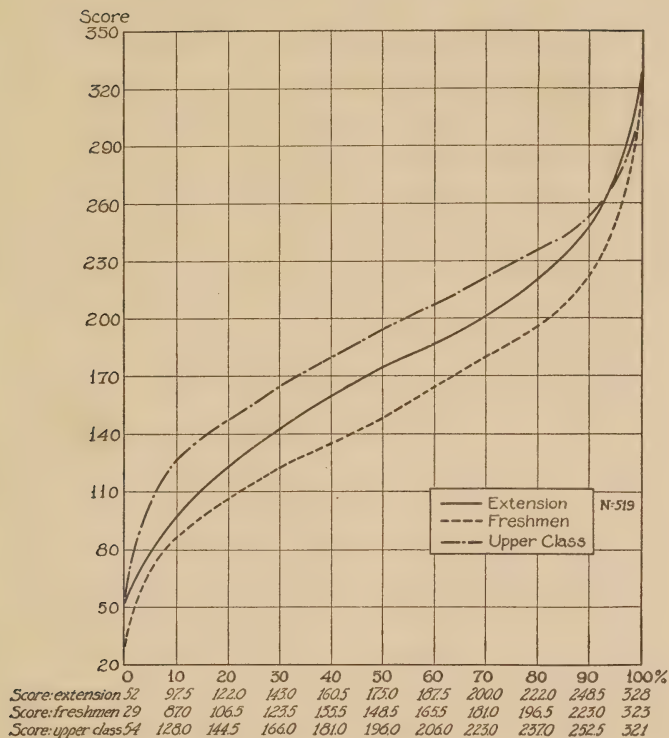


FIGURE 7.—COMPARATIVE MENTAL ABILITIES OF EXTENSION AND RESIDENCE STUDENTS IN UNIVERSITY F

students take a position approximately halfway between the freshmen and the upperclassmen.

The general superiority of the upperclassmen may be explained by the elimination of the poorer students in the course of the freshman year. Within the extension group there are also students who, if they had attended

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full-time classes, would have been culled out by the selective process that goes on during the freshman and later years. It is also possible that some students who dropped out of college before finishing have registered later for extension classes.

Here, as at all universities, it was found that the best extension students are as good or better than the best of the residence students. Near the top, the curve for extension students crosses that for upperclassmen and reaches the highest point of the three curves.

The findings of a recently published study corroborate those reported here.<sup>3</sup> It is a systematic investigation by McGrath and Froman of the University of Buffalo evening session students, and the pattern of its findings corresponds in many details to the patterns of this investigation and of the Minnesota study;<sup>4</sup> thus they tend to validate each other. For example, McGrath and Froman concluded that the evening students of the University of Buffalo were of college caliber, determined by the standards of the residence student body; and according to the results of a vocabulary test administered to both evening and day students, the evening students, although inferior to the seniors, were slightly superior to the freshmen.

*Conclusions.*—The evidence indicates that the measured abilities of extension and nonextension students are essentially equal. In some universities the extension stu-

<sup>3</sup> Earl J. McGrath and Lewis A. Froman, *The College Aptitude of Adult Students*, University of Buffalo Studies, Vol. XIV, No. 1 (1936).

<sup>4</sup> Sorenson, *Adult Abilities in Extension Classes*.

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dents have higher abilities and in others the full-time students are slightly superior, but the differences are not very large at any university. They do indicate, however, that any existing superiority is found within the adult group. The scores of the poorest extension students are as low as, and sometimes lower than, those of the poorest residence students, but the best extension students are probably a little more capable than the best non-extension students.

A consistent characteristic of the extension groups of various universities is the wide range of abilities within the group. Although the curves for the two groups do not coincide, they do indicate that the range and distribution of abilities within extension and nonextension groups are very similar.

Another characteristic of the curves for the two groups is their greater similarity and frequent convergence at their upper ends, which means that in most universities the best students of one group are approximately equal to the best of the other.

As a whole, then, it may be concluded that in terms of classroom standards, most extension students have adequate aptitude for college work and constitute a student body with ability equal to the standard set by the college for its resident students.

### THE VALIDITY OF THESE COMPARISONS

The fact that the extension students are in most instances being compared with freshmen rather than with upperclassmen may be considered a circumstance influ-

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encing the data, since the more mature extension student might be expected to have an advantage over the beginning college student. First-year residence students were used for these comparisons because most universities administer tests to their matriculating freshmen and consequently, complete records are available for freshmen, but not for sophomores, juniors, seniors, and graduate students.

No important discrepancy, however, arises from a comparison of extension students with freshmen, since the latter constitute a substantial portion of the college enrollment. It is true that sophomores and each succeeding class show higher abilities than the class below. But since these differences are in terms of the average only, there must be many individuals in each college class who have more native capacity than individuals in the classes above them. In fact, the best freshmen must have as much potential capacity as the best students of any class, since the source of upperclassmen is the freshman class.

These differences in average ability are not accounted for by an increase in capacity during college, but by the elimination of the poorer students. If one traces a freshman class through graduation and into the graduate school, he will discover that the majority of those who have discontinued their university work before graduation belong to the low-capacity group, and that thus a higher average of capacity has been obtained for each successive year.

The fact that the extension students have had on the



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average more education than the freshmen might also be thought to invalidate the comparison of the two groups. But it is not necessary that the number of years of education be the same for both groups because we are attempting to determine the general capacity of extension students in terms of the typical college student of a particular university. The more education any extension student has had, other things being equal, the greater his qualifications for university study and the higher the average of his group. But it is also true that some extension students have not graduated from high school and a few have not completed the eighth grade. While a number of these have much more ability than ordinarily might be expected, others have not, and their capacity, too, influences the average.

The most important fact to bear in mind with regard to all student bodies, residence or extension, is that the greatest difference in ability occurs within the groups rather than between them. The range in either group is so wide that the students with least capacity are perhaps farther below the best students in mental ability than a feeble-minded individual is below the average. We can make this more concrete by saying that if fifty of the dullest students were exposed to four years of college education and fifty of the most capable students were deprived of a college education, comprehensive examinations given to both groups at the end of the period would probably show that none, or at most very few, of the dull students made as good scores as the capable individuals.

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### THE RELATIONSHIP BETWEEN ABILITY AND AMOUNT OF EDUCATION

It is generally accepted that there is a positive correlation between the years of schooling and intelligence as measured by tests. In general, the trend of the relation between these two factors is consistent. Individuals with more education have more intelligence, and those with the least education have the least intelligence. Or perhaps it is a case of persons with more intelligence having more education and those with the least intelligence having the least education.

Thus far the general or "on the average" relationship has been discussed. There are, of course, many exceptions. For example, some adults with much native intelligence have spent little time in the classroom. Some of them are immigrants, but the number of this group is rapidly decreasing because of the restriction on immigration. Furthermore, with grade and high school education now practically universal, the number of people with good capacity who do not have a high school education is becoming smaller and smaller. On the other hand, the number of individuals with four or more years of college education but with mediocre intelligence is increasing. There are now many individuals of comparatively little native intelligence with a high school education, who, if they can afford it, will probably enter college.

This is not an appalling situation; it merely indicates that because the number of high school graduates is larger than it was formerly, there are many with fairly low

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intelligence quotients included. A comparable situation exists in the colleges. The number of high school and college graduates with low native intelligence is increasing because of the general increase in enrollments and the lack of selection of the more capable students. Furthermore, the economic necessity of keeping young people in school for longer periods is affecting the caliber of high school and college graduates. These conditions will decrease the number of intelligent adults who have had little formal training, though there will still be, of course, numerous bright individuals who discontinue their education after reaching the compulsory age limit. Even they, however, will in most instances have more formal education than the seven or eight years which is now typical or average in the United States.

If economic conditions continue to be adverse and special provisions are not made for sending the more capable boys and girls to college, we shall in the future have a considerable population of adults with good native capacity but with only a high school education or less. A psychological study of the abilities of high school graduates who enrolled in "freshman depression colleges" showed that they were quite as capable as students who could afford to go to college.<sup>5</sup>

It may be inferred from Smith's study that economic conditions cause many capable youths to discontinue their education long before they cease to profit from it.

<sup>5</sup> Harry P. Smith, "Psychological Examinations Administered by Syracuse University," *School and Society*, 41:134-36 (1935).

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Some of them will appear in extension classes a decade or more later as persons with comparatively little education but with high capacity for learning.

According to the findings of the present study the number of extension students with less than a high school education is proportionately small—only 10 to 15 per cent of the total. In one university there is only a slight difference between the abilities of adults with less than twelve years of education and those with twelve years or more. However, the average ability of all groups with twelve or fewer years of school training is less than that for the entire extension group. The average ability of adults with fourteen years of education is slightly above that of the entire extension group, and students with sixteen or more years of formal education are considerably above the average and represent a significant selection in ability.

The results of the Minnesota study differ from these findings in that in the former the individuals with the least education have clearly less measured ability, and those with the most formal education do not exceed the average to the same extent as the groups in the university just described.<sup>6</sup> The comparative differences in these relationships are not very large for the adults who have the most education but are significant for those who have the least.

It is very interesting to note that the lowest scores of individuals with little education are higher than the

<sup>6</sup> Sorenson, *Adult Abilities in Extension Classes*, pp. 37, 42.

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lowest scores of those with more education, and that the highest scores of the former are lower than the highest scores of the latter. In other words, the range of abilities is less for those with little education, since their scores do not extend so far in either direction.

In one extension division where very few individuals with little formal education are enrolled, the average abilities are very low. Even the adults who have graduated from high school are slightly below the average for the entire group. But in this same university the adults with sixteen or more years of formal education are above the average aptitude of the total extension enrollment.

The data from all universities suggest the same general conclusion. There is a consistent tendency for individuals with more education to have greater ability. A certain number of years of education indicates a general aptitude for university work because individuals with more native capacity survive longer in school. They have the capacity which enables them to continue further in advanced and difficult studies.

Table 6 contains data which show the typical relationship between years of schooling and measured ability. It is of interest to note that there is an exception to the trend in the average score for the six-year group, which is higher than that for three groups with more schooling. The explanation is that some adults of very little education have comparatively high ability.

The percentile rank indicates in per cent the position

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of each mean score in the distribution of all the scores. For example, 52 per cent of all scores are found below a score of forty-three, and 42 per cent of all scores are below a score of thirty-nine. Thus, the percentile rank shows the standing of each group, according to its average score, in relationship to all the scores.

TABLE 6.—MEAN SCORES AND PERCENTILE RANKS ON VOCABULARY TEST, ARRANGED ACCORDING TO YEARS OF SCHOOLING

Number in Group	Years of Schooling	Test Scores	
		Mean score	Percentile rank
6	6	43	52
53	8	39	42
65	10	40	45
307	12	41	47
230	14	46	59
217	16	50	67
38	18	56	78

Although the Minnesota study did not attempt to evaluate the learning power of adults over an age range, it did indicate the relative importance of intelligence and amount of formal schooling. It compared the classroom achievement of four groups of adults, each numbering from fifty to sixty-five persons. The average amount of formal education for two of the groups was approximately 14.5 years, and for the other two groups approximately 8.5 years. The data obtained for the four groups, which also differed in mental abilities, are presented in Table 7, an adaptation of the table originally published.

These data indicate that there is a very significant relationship between differences in mental ability and



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achievement, and a comparatively unimportant relation between years of formal education and achievement. It

TABLE 7.—HONOR-POINT AVERAGES ACCORDING TO  
MENTAL LEVEL AND YEARS OF SCHOOLING\*

	Average Scores		
	College ability score	Reading score	Honor-point average
Group I ( <i>N</i> = 60) . . . . .	397.00	19.00	1.98
Minimum score, 360			
Minimum education, 13 yrs.			
Average education, 14.60 yrs.			
Average age, 32.90 yrs.			
Group II ( <i>N</i> = 50) . . . . .	390.00	16.90	1.79
Minimum score, 360			
Maximum education, 10 yrs.			
Average education, 8.90 yrs.			
Average age, 35.68 yrs.			
Group III ( <i>N</i> = 65) . . . . .	200.00	11.50	1.44
Maximum score, 250			
Minimum education, 13 yrs.			
Average education, 14.6 yrs.			
Average age, 29.40 yrs.			
Group IV ( <i>N</i> = 64) . . . . .	172.00	9.00	1.48
Maximum score, 250			
Maximum education, 10 yrs.			
Average education, 8.20 yrs.			
Average age, 31.00 yrs.			

\* Adapted from Table 26 in Sorenson, *Adult Abilities in Extension Classes*, p. 82.

should be mentioned that the average ability of groups I and II is equal to the eighty-fifth percentile of all University of Minnesota extension students, while the average for groups III and IV is equal to the seventh percentile. The marks or honor points were determined on the basis of course work in the same or comparable classes, so that a comparison of the honor-point averages

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indicates the relative effect of native ability and years of schooling on achievement.

It appears from these data that native mental capacity is a more important factor in the school success of adults than their number of years of education. If a teacher were given an ambitious adult with little formal education but with high native capacity as measured by general intelligence tests and an adult with a college degree but with comparatively little such mental equipment, the instructor would be able to teach the unschooled adult more effectively than the college graduate. The unschooled adult may need to learn some of the basic work, but he will master it in a surprisingly short time.

O'Connor discovered a somewhat comparable situation among business executives.<sup>7</sup> Vocabulary tests were given to men with varying amounts of formal education who were holding similar executive positions. The vocabularies of executives with a college diploma were compared with those of executives who had discontinued their formal education when they were fifteen years old. The results indicate that the latter have vocabularies as extensive as those of the college graduates. In general, it seems that in business as well as in adult education, inherent capacity has more to do with determining success than has the amount of formal schooling.

It is perhaps such facts as these that have led to the facetious statement that "intelligence is something which

<sup>7</sup> Johnson O'Connor, "Vocabulary and Success," *Atlantic Monthly*, 153:160-66 (1934).

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enables one to get along in the world without education, and education is something which enables one to get along without intelligence." Of course, the individuals with more intelligence generally have more education (this is true among extension students), and the adults with more education may generally be expected to be capable of doing more and better work than those with less. The adults with the least education have on the average the least ability. But, in spite of this average relationship; our data show that the instructor should not judge the abilities of the individual student by the amount of education he has had. He should not only be aware of the general fact but should also recognize the individual differences.

### THE RELATIONSHIP BETWEEN ABILITY AND THE TIME SPENT ON THE VARIOUS STAGES OF FORMAL EDUCATION

The usual "terminal points" in education come at the end of the eighth grade, high school, two-year teachers college, junior college, and four-year college. Although some individuals discontinue their formal schooling at other points on the educational ladder, most students aim at graduation from one of the units indicated by these terminal points.

Many students continue their formal education without interruption up to a certain point, after which they never resume it. A smaller number of students discontinue their formal education for a period of one or more years but resume it eventually. Some of this latter group,

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after graduating from high school, remain out of school for a time before entering college. Many graduates of two-year normal schools or teachers colleges may teach for several years before they enroll for full- or part-time senior college work in order to obtain a college degree.

Not capacity alone, but also economic and social factors determine the amount of education one acquires. Many students of considerable ability are forced to discontinue their schooling long before the work becomes too difficult for them. There are even a few with capacity for successful graduate work who stop their formal education early in life. Some of these individuals will re-enter school later for full-time work. Others will subscribe for correspondence courses, and still others will enroll in extension classes.

What are the forces that return these individuals to formal and systematic study? Perhaps they have been frustrated by social and economic conditions and seek to solve their difficulties through education. They wish to hasten their vocational success. Some, perhaps, have high mental ability and find that out-of-school life is barren and dull. Their minds crave stimulation, and they seek it in extension classes.

This should mean that extension students who have resumed their classwork after an interval of out-of-school experience or who have continued classwork on a part-time basis, so that they have not made the "normal" progress, possess high mental capacity, and the facts indicate that such is the case. Those who return to school-

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work after an interval of a few years tend to have high capacity. The data in the Minnesota study are extensive on this point and are substantiated by findings from other institutions. In general, students who complete their educational program within less than average time have more ability than those who take the usual period; those who finish in a year or two more than the average tend to have less than average ability; but those who take considerably more than average time tend to be high in ability.

These facts may be illustrated as follows: the typical or average interval between high school graduation and college graduation is four years. Some students finish school in less than that period, and it is they who are generally the most capable. Those students who take slightly more than four years are less capable than those who take the usual four years. But those who alternate work and study so that they require eight or ten years after high school to obtain a college degree tend to be more capable than those who complete their college course in the average time.

Essentially the same trend is apparent for the relationship of ability to the time between eighth grade and high school graduation, and also between high school and teachers college graduation (two years). Those who need a few years more than the average time to finish their courses have the least ability, but students who spend eight to ten or more years between graduations tend to have more than average ability.

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These differences in ability are not large, so that the trend is not very marked. Nevertheless, it is of psychological interest, for it indicates that the selective factor operating to bring out-of-school individuals back into the classroom is not an unfavorable one. Those who return after an absence or continue at such a rate that they have to work a few years longer to complete their courses have capacity approximately as high as, and in some instances slightly higher than, those who continue their schooling without interruption.

TABLE 8.—VOCABULARY AND PARAGRAPH-READING SCORES ARRANGED  
ACCORDING TO INTERVAL BETWEEN GRADUATION FROM  
HIGH SCHOOL AND FROM COLLEGE

Interval	Vocabulary		Paragraph-Reading	
	Mean score	Percentile rank	Mean score	Percentile rank
Less than normal.....	47.5	61	17.8	60
4 years (normal).....	52.0	70	18.9	68
5 years.....	51.6	69	19.7	74
6 years.....	51.4	69	20.1	75
7 years.....	51.1	68	15.5	44
8 years.....	50.3	67	14.3	33
9 years.....	63.5	86	21.3	83
10 years.....	36.0	33	11.0	15
11 years.....	65.7	88	22.0	86
12 years or over.....	48.6	63	21.2	83

Table 8 illustrates this general trend of ability in relation to the number of years between graduation periods. In this particular instance, however, those whose time was less than normal had less ability than those who took the normal time, a condition which is not typical but rather unexpected. The irregularity in the mean scores



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is a result of the small number of cases tested; nevertheless, it is apparent that the typical extension student, who must take more time to complete the given stage, has as much ability as the student who passes from one graduation to the next without any interruption. The data on this point in the Minnesota study correspond to those obtained in this study.<sup>8</sup>

Extension education has been criticized for not measuring up to academic standards, partly, no doubt, because some extension divisions offer courses to adult groups that are not considered of university grade, as that grade is usually determined. But we ought not to ignore the great majority of adults who do not possess the capacity for doing formal extension work effectively enough to earn university credit. The question is, of course, to what extent the university should sponsor education for those of so-called subuniversity grade. The public schools and other agencies can offer more to the bulk of the population than the university can, but to secure the most effective program the university and other educational agencies must coordinate and integrate their activities.

However, it would seem that if funds are limited they should be devoted to those who can profit most from adult education on a university level. A large proportion of adults probably have no interest in systematic education, but a considerable number of them do. They are capable individuals eager for intellectual stimulation.

<sup>8</sup> Compare Sorenson, *Adult Abilities in Extension Classes*, pp. 72-79.

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They are not reached by the regular classes and do not have other opportunities to satisfy their intellectual curiosity. It is for them first that extension work should be planned.

### COMPARATIVE MENTAL ABILITIES OF MEN AND WOMEN IN EXTENSION CLASSES

*According to the total scores.*—In all the universities studied, with one exception, the women's scores were higher than those of the men. Figure 8 shows the usual relationship between men's and women's scores in intelligence tests.

These findings should not be interpreted as indicating that women in general have greater mental capacity than men. The two sexes are probably on a par as far as general intelligence is concerned, and the superiority of women in extension classes may be caused by a better selection of women. On the average, they rank higher vocationally than the men and have had more years of formal schooling. Furthermore, the fact that the intelligence tests used were linguistic and emphasized the vocabulary element was perhaps an advantage for the women, since they are innately superior in handling materials of that nature.

The highest and lowest scores of the two sexes should be noted when considering sex differences. Generally, the scores for men and women differ throughout most of the range but are approximately the same at the extremities. These results indicate that the most capable men in ex-

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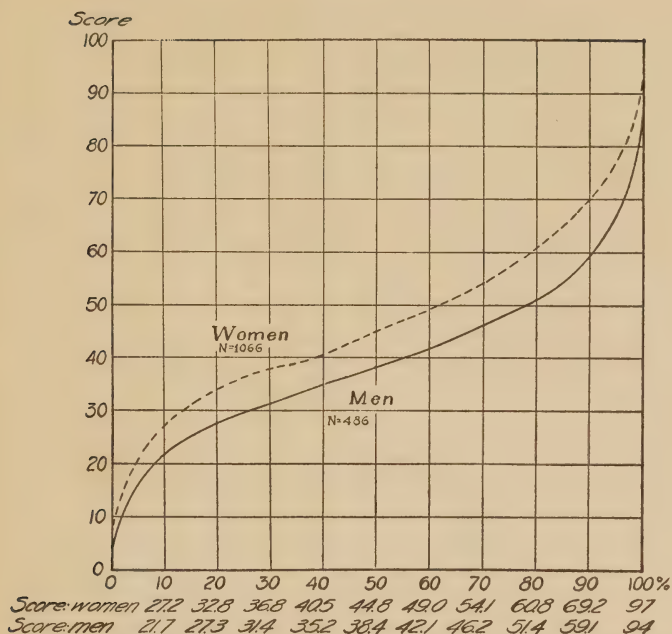


FIGURE 8.—INTELLIGENCE TEST SCORES OF MEN AND OF WOMEN

tension classes are equal to the most capable women, and the poorest students in the two sexes are also approximately equal.

*In various types of abilities.*—The sex differences described above are based on the total scores in the tests given, which were composites of various subtests—such as vocabulary, arithmetic, analogies, completion, and reading. Sex differences for the various subtests are not the same as for the tests as a whole. For example, in one extension division the men are superior to the women in

## ADULT ABILITIES

the ability to extract meaning from printed paragraphs (Figure 9), but the same men are inferior to the women in the ability to define words (Figure 10). Thus, the relationship between the abilities of the sexes is not constant for paragraph-reading and vocabulary.

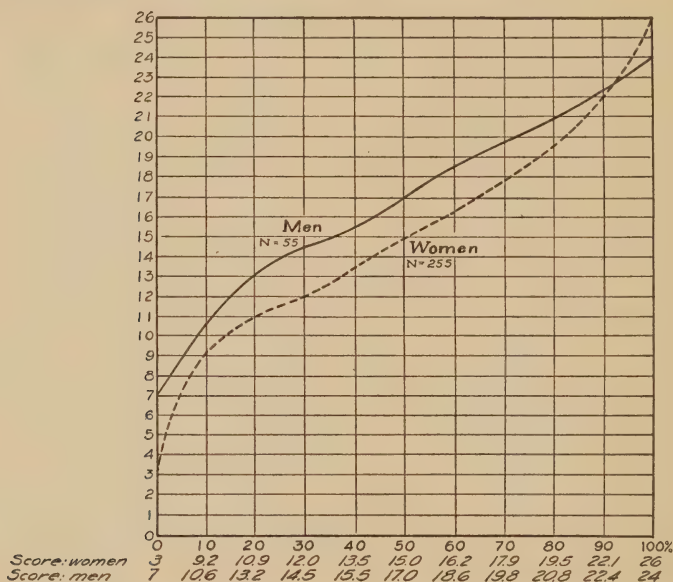


FIGURE 9.—PARAGRAPH-READING TEST SCORES OF MEN AND OF WOMEN

The results from all universities consistently indicate that men are superior to women in reading but that women have better vocabularies. In fact, the results were so consistent that the observed differences in reading and vocabulary abilities appear to constitute a real sex difference among adults. Figures 9 and 10, based on the

## MENTAL ABILITIES

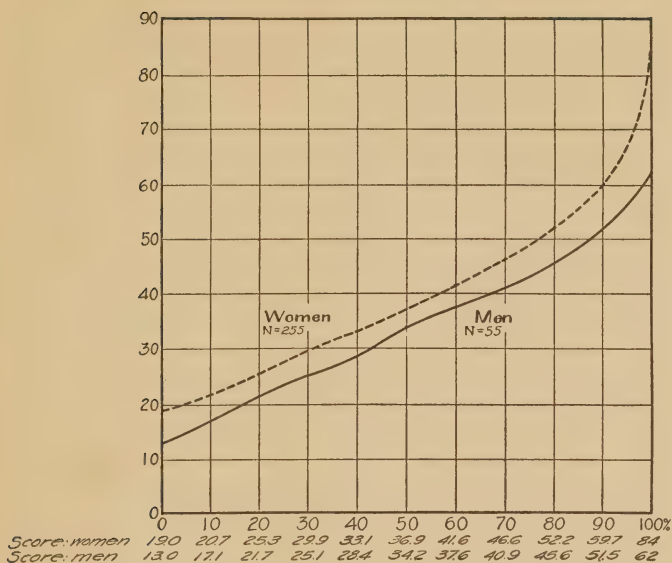


FIGURE 10.—VOCABULARY TEST SCORES OF MEN AND OF WOMEN

findings in one university, illustrate the reversed relationships between men and women in vocabulary and reading abilities.

In verbal analogies the women are again superior to the men (Figure 11), but in the nonverbal subtest consisting of analogies involving figures and forms, it is the men that are markedly superior (Figure 12). In general, women are superior in tests involving words, and men in tests dealing with the relationship of forms and symbols.

The results on arithmetic subtests indicate that men have an advantage in arithmetical ability (Figure 13). This difference is also present in boys and girls. Careful

## ADULT ABILITIES

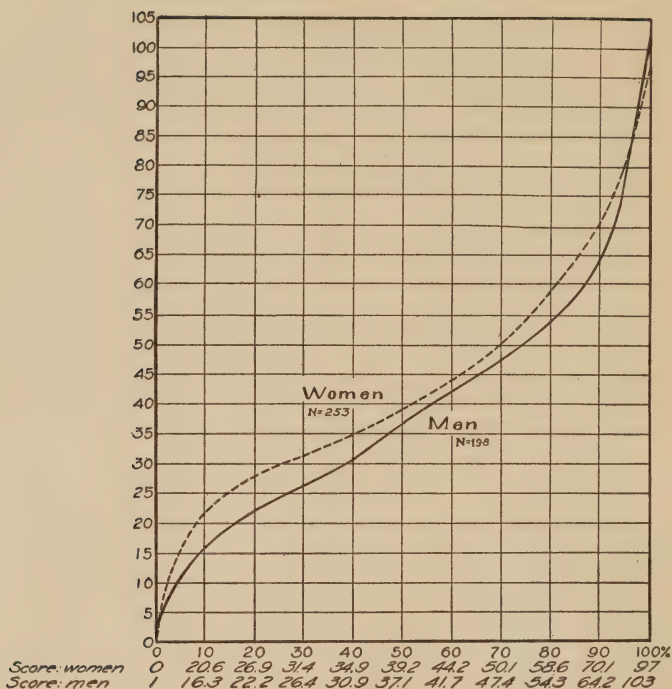


FIGURE 11.—VERBAL ANALOGIES TEST SCORES OF MEN AND OF WOMEN

studies of sex differences indicate that boys are superior to girls in arithmetic.

The ability to translate artificial language declines with age for both sexes;<sup>9</sup> so does ability in nonverbal analogies. Women of all ages are consistently superior to men in artificial-language tests (Figure 14).

*Summary of sex differences.*—In general, the women in extension classes score higher than the men principally

<sup>9</sup> For a description of artificial language, see page 144.



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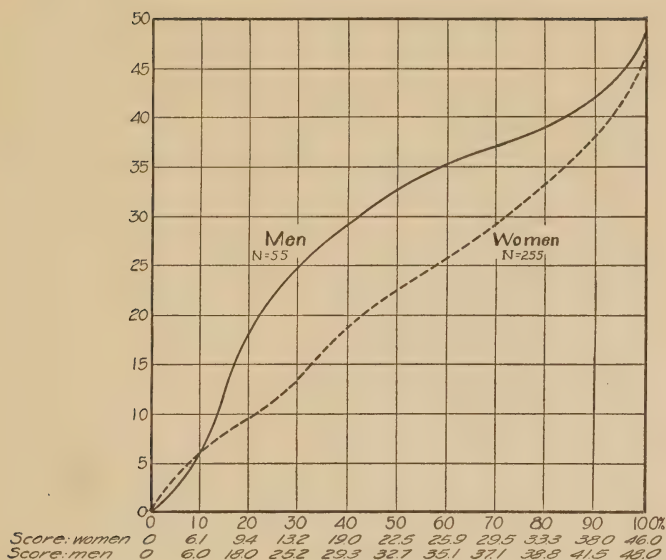


FIGURE 12.—NONVERBAL ANALOGIES TEST SCORES OF MEN AND OF WOMEN

because there seems to be a better selection of women than of men. Moreover, it is possible that the tests generally used are constructed from material in which the women have an advantage. The scores in the subtests indicate that women are superior in word tests—that is, in tests with synonyms, antonyms, completion, verbal analogies, and translations involving an artificial language. Men are superior in arithmetic, nonverbal analogies, and comprehension of reading materials.

The causes and significance of these differences can be only a matter for speculation. They may reflect inherent sex differences in mental capacity, or they may mere-

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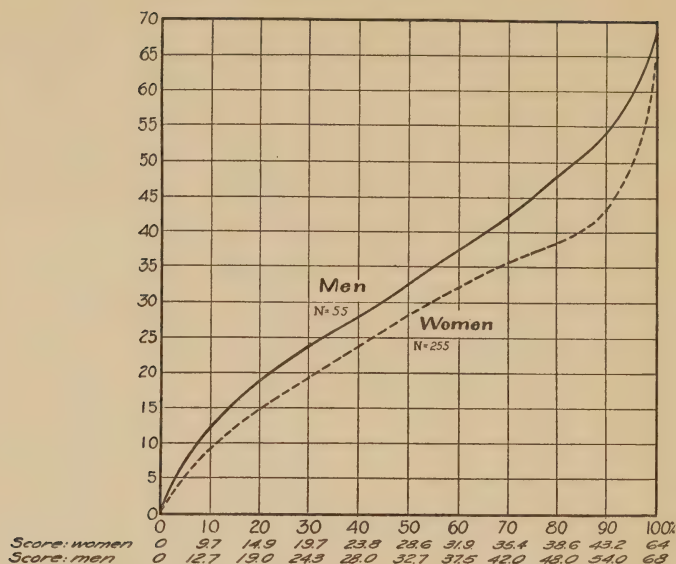


FIGURE 13.—ARITHMETIC TEST SCORES OF MEN AND OF WOMEN

ly reflect differing experiences and interests. The usefulness of knowing these facts may lie in the clue they give for understanding the organization of the adult mind.

### VARIATION IN MENTAL ABILITY

*According to age.*—There are no very definite trends in variability, or range of ability, according to age. It might be expected that there would be a wider range in the abilities of students aged fifty years or older than of students in their twenties and thirties, i.e., the distance separating the duller and the brighter adults might be expected to increase with age. On the other hand, if uni-

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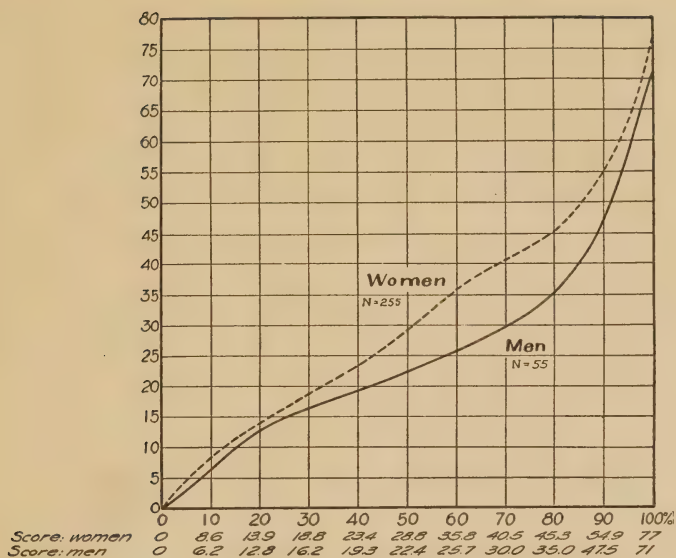


FIGURE 14.—ARTIFICIAL-LANGUAGE TEST SCORES OF MEN AND OF WOMEN

versity extension classes attract only the more capable older adults, the least variability would be found among the oldest students.

Examination of the data for the various institutions reveals no consistent trend. In some instances the groups of oldest students are the least variable, in others they are the most variable, in still others only moderately so. These results are due to the selection that occurs in various institutions and should not be interpreted as indicating the true variability in adults of a more advanced age.

It would be interesting to have an accurate sampling of adults of all ages in order to check the variability of

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each age group. If the less able die at a greater rate than the more capable, the range of abilities would decrease with age. If the bright and capable profit more from living than the dull, variability would increase with age. It is also possible that abilities regress toward the mean, thus causing greater concentration. These propositions are speculative, but they raise questions that need to be answered.

The difference in the variability of the same age group for different tests is consistent with the differential trend of abilities with age.<sup>10</sup> In one case the most variable group for the artificial-language test and the least variable for the completion and analogies tests is an old-age group. In another instance, the least range in the analogies test and the most in the arithmetic test occurs in a young group. In the latter university the group from forty-five to forty-nine years old is most variable in the analogies test and least variable in the completion and artificial-language tests.

These differences may be caused partially by the statistical unreliability inherent in the small size of some of the groups, but they do indicate to some extent the differential response of age groups to various kinds of test materials. These facts concur with other findings that reveal differential trends in ability with age. It may be, of course, that the trend in ability for different ages was determined by the nature of the test materials.

*According to sex.*—One sex did not always show greater variability than the other in the various institutions

<sup>10</sup> For a discussion of the differential trend with age, see pages 139-72.

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studied, but there was perhaps a tendency for the women to show a slightly greater range than the men. According to some theories in psychology, men are more variable than women; it has been maintained that the best men are superior to the best women and the poorest men inferior to the poorest women. This may be true for the population as a whole, but it is not true for extension students.

It is interesting to note, however, that each sex displays the most variability in those powers in which it is distinctly superior to the other sex. Men are superior in arithmetical ability and also display the greatest comparative range in that field. Women are superior in vocabulary tests and likewise have the widest range in that ability. Although these facts are not of great pedagogical importance, they may have psychological interest.

*According to years of schooling.*—There is no greater range in the abilities of extension students who have not completed high school than there is among those who have almost completed college. The variability is about the same for all groups regardless of the years of schooling.

*According to vocational status.*—There is a considerable difference in variability among vocational groups. No well-defined trend from the relatively unskilled workers to the professions is apparent, but some groups show definitely more, or less, variability in mental abilities than others. The extension students who are unemployed show a wide range of scores. Apparently, the un-

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employed who seek betterment through education vary widely in their ability to profit from extension courses. Counseling and guidance would be very beneficial to these adults as well as to others who seek to circumvent adverse economic and social forces by getting more education.

It happens that draftsmen and retail dealers, who are of approximately the same vocational status, are comparatively homogeneous in ability. Plasterers, firemen, and others in similar vocations are also homogeneous; but mail carriers, farmers, and painters, usually linked in occupational classifications, display great variability. These facts do not mean that the total memberships of the various occupational groups compare in the manner described. There is probably much less difference in variability among all the members of various occupational groups than there is among those members of the groups in extension classes. The differences in variability found in occupational groups in extension classes are caused by the nature of the selection, much of which is probably accidental.

### SUMMARY

A comparison of the measured mental abilities of extension and nonextension students of a number of universities indicates that they are approximately equal. In some institutions the residence students are superior, and in others the extension students rank higher; but on the average the two groups may be considered about equal.



## MENTAL ABILITIES

The mental ability of extension students corresponds in a general way to the amount of education they have had. There are, of course, many students with little formal education who are more capable than many of those with more schooling; but on the average, the amount of one's education is an indication of his ability to do college work.

Women extension students possess more ability as measured by aptitude tests than do the men. In some specific abilities the men are superior, while in others the relationship is reversed, thus showing a variation in sex differences for the several abilities.

The variability or range of abilities differs in relation to a number of factors. It differs according to age, sex, occupational status, and the type of ability tested. In some age groups and for some abilities, there is considerably less range than for others. The same is true for the sexes and occupational groups. This indicates that variability is controlled in part by the nature of the test itself, and also that the selection of extension students is not uniform for all factors.

Mental ability is roughly related to the regularity with which students proceed through their school years. It is important to note that students who take considerably more than a normal amount of time in their formal education are often unusually capable. These are the people who go the extension route, so to speak, and their achievement indicates that the extension system of education tends to select the more capable students.

### THE CLASSROOM ACHIEVEMENT OF EXTENSION STUDENTS

#### OBJECTIVE DATA

THROUGH the cooperation of directors of extension divisions, objective data have been collected on the classroom achievement of fifty pairs of comparable daytime and evening classes. For each pair the instructor, subject matter, and examinations were the same. In some instances the examinations were of the essay type, and in others of the objective type.

Because it was not possible to obtain many comparable classes that met the necessary requirements, the comparisons are relatively limited in number; but we believe they comply with the principles of good sampling. The *Literary Digest* presidential poll of 1936 showed that a large sample is not necessarily a good one; and Maine's failure as a sample in the same year indicated that any sample, whether small or large, must adhere to certain statistical requirements, which need not be enumerated here. Our fifty pairs of comparable classes constitute, we believe, an adequate index to the actual achievement of extension and residence students.

According to the results of this sampling, the extension

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classes have a slight advantage; twenty-six of the extension classes were found to be superior, fourteen inferior, and ten equal, to the residence classes. Where differences exist they are usually small and not very important. In one instance the campus class was very superior to the extension class in a course in mental hygiene, while the extension class was decidedly superior in elementary French. Various findings indicate that in elementary language courses the adults seem to be superior, probably because they come to class with some knowledge of the language they elect to study and also with a special interest in it.

The results of the objective and subjective examinations were similar. The extension students were relatively as capable in the newer and more factual type of examination as in the discussion or essay type.

### INSTRUCTORS' EVALUATIONS

The opinions of the instructors concur with the objective results. Professors who teach both residence and extension students should know their comparative abilities through classroom recitations, discussions, and examinations. Since these instructors are experienced in appraising their students, and since they make such evaluations one of their major objectives, their statements should be significant.

The writer interviewed a total of eighty-nine instructors in fifteen universities, asking them, among other things, which group, residence or extension students,

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ranked higher in achievement. The instructors generally agreed that extension classes on the average achieve as high standards as do comparable residence classes. The eighty-nine instructors were almost equally divided in their opinions, about one-third holding that the achievement of extension students is superior to that of residence students, the same number that it is inferior, and another third that there is no essential difference. Some of the instructors who considered extension classes inferior altered their opinions when the results of an examination administered to both groups indicated that extension students are superior. The fact that the evaluations of the instructors correspond reasonably well with the objective evidence suggests that instructors' opinions on similar problems are also valid.

"The best students in extension classes are exceptional" is a remark frequently made by the professors. Numerous university instructors have commented on the fact that the very best students in their extramural classes are superior to the very best students in their residence classes; but conversely the poorest extension students are inferior to the poorest campus students.

Data on the achievement of extension students tend to support the observations of the instructors, and the results of aptitude tests administered to them show that their best scores are very high. Since extension students have superior abilities and are probably outstanding for good volitional traits, it may be accepted as a fact that the best of the group are students of the highest type.

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### FACTORS INFLUENCING THE COMPARATIVE ACHIEVEMENT OF EXTENSION AND RESIDENCE STUDENTS

*Extravocational character of extension classes.*—University instructors frequently hold the opinion that the extension student would do considerably better work if he were a full-time student. The adults attending class after their working hours are earnest and capable but tired when they arrive at class. They display little vigor and responsiveness in a class meeting at four o'clock in the afternoon of a day late in the week. If they were full-time students, the major part of their time and interest would be concentrated on their lessons, and they would not be doing their classwork in addition to their vocation, which takes most of their energies.

Elementary- and secondary-school teachers do better class work in summer school than in extension classes. Summer session students in colleges of education, most of whom are teachers in service, achieve higher standards than do students in the same courses during the other quarters or semesters of the school year. These facts, coupled with other evidence, indirectly support the contention that extension adults would do better work as full-time students than they do on a part-time basis.

In addition to lacking time and energy for either extensive or intensive study, extension students are usually far from the academic environment and so from any predisposition to scholarly activities that environment may foster. Thus the very difference in milieu favors the residence students.

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*Selection in extension classes.*—On the other hand, the failure of inferior students to continue their courses is conducive to a high average achievement in extension classes. Those who find the work difficult or who do not have the drive to keep at it quit before they have gone very far. Consequently, the students who actually complete the work are usually the superior ones. The fact that less ambitious adults do not enroll for courses also aids in explaining the comparatively high selection of extension students. There are instances, of course, in which these selective factors do not operate, and there the quality of the students is lower than in classes where conditions are usual.

*Amount of academic background.*—Another factor that affects the relative achievement of extension and nonextension students is their academic background. In advanced courses in languages, mathematics, psychology, the natural sciences, and related subjects, many aspiring adult students do not have adequate preparatory training. Certain advanced and technical courses as well as some more elementary ones should generally be preceded by prerequisite courses or by extensive review, for even when extension students have had the necessary preliminary training, they may have acquired it at a period so remote that they have forgotten what they learned or the information is obsolete. For example, the residence students in a course in individual mental testing are better prepared than schoolteachers enrolled in the same course at night school. The younger students,



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some of whom are graduates and majors in psychology, have probably had several courses in psychology, while the extension students have had fewer allied courses. In all such cases the regular students will generally do better work because they have acquired more adequate backgrounds.

It should not be concluded from the instances cited that extension students are always poorly prepared for their courses. On the contrary, they are often well prepared. Furthermore, as adult education becomes more general and as the professions demand more sustained and continuous education, the number of adults who lack adequate backgrounds for extension courses will decrease.

In the long run the classroom achievement of adults is determined primarily, not by their years of formal education, but by their mental capacity. This fact should be recognized in guiding extension students and in considering their requests to enroll for certain courses. Adults of high capacity can often safely be permitted to take courses for which they may not have the listed prerequisites, except in the case of some few advanced technical courses. Our attitude toward the adult student should be as sensible as that of the baseball scout who is concerned, not with the amount of experience and training the rookie has had, but with his ability or lack of ability to play big-league baseball. Similarly, the qualifications of an adult should be judged not only by the number of years he has spent in school but also by his actual capaci-

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ties, the chief source of which may be the germ cells of his ancestors.

Other factors that may influence the achievement of extension students are primarily the circumstances that affect adult learning, such as the effect of age on learning power, the drive of specific motives and interests, and the wider experience that may give adult students more power to understand and interpret—that “wider horizontal development” that enables some adults, even some with low measured aptitude, to exceed all normal expectations in the quality of their work. These factors are important enough to be worth further consideration at this point.

### FACTORS AFFECTING ADULT LEARNING

*Age.*—Both the results obtained from investigations and the opinions of individuals differ in regard to the effect of increasing age on learning powers. Many teachers of extension students have made the interesting observation that some of their best students are very mature; some are in their fifties and a few are over sixty. No teacher who was interviewed believed that age is a bar to successful classwork if the persons concerned have kept mentally active.

Many instructors support the theory that certain powers are lost in adult life because of disuse, but that they can be renewed by those who have the inclination to engage in serious and exacting study. A professor who teaches government engineers at the University of Col-

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orado stated that in mathematics, after the "rust wears off" through review, students forty and fifty years old are just as teachable as campus students, if not more so. It appears that education itself is enlivening and that the processes of study which stimulate vigorous cerebral activity maintain the intellectual powers. After mental maturity is reached, the manner in which the mind has been used is a more important factor than age (exclusive of senility). There are, of course, students in the forties, fifties, and sixties who do not derive much profit from college instruction; but it is possible that these students were likewise dull when they were young.

If we believe some of the published research on the decline of mental ability, we may all expect as a matter of course a retrogression to our former eighth- and ninth-grade levels by the time we reach fifty or sixty years of age; or, having reached those ages, we may despair of ever regaining the mental ability of our later teens. However, there is much evidence to indicate that adults of any age can derive benefit in varying degrees from instruction. A distinguished physician noted for his interest in the continued education of practicing physicians and surgeons has stated that there is no period in adult life when a graduate of a medical school cannot be taught with great benefit to himself.

The opinions of those who instruct chemists, engineers, school superintendents, and businessmen are of a slightly different tenor. They state that adults acquire very little new knowledge in extension courses unless they

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have a definite interest in or feel a need for such knowledge. The fact remains, however, that age does not necessarily preclude learning and that, in general, adults can profit from instruction.<sup>1</sup>

*Attitudes and prejudices.*—Deep-rooted mental habits, prejudices, and emotional attitudes are more likely to interfere with an older adult's learning than with that of adolescents and young adults. This is doubtless caused by the greater fixity of mental and emotional states among older people, a factor that operates with special force when professional practices, principles, and theories are involved. A doctor may be prejudiced in favor of the techniques he has employed or a teacher may prefer the methods he has found useful, regardless of new ideas about those techniques or methods. Strong preconceptions and prejudices in economics, political science, and the other social studies almost preclude the consideration and acceptance of conflicting ideas and cause many individuals to be nearly impervious to education in those fields.

The tenacity of mental attitudes that stunt the educational processes for many adults can be explained by the fact that these attitudes are strongly integrated with the instinct for survival. Young adults are not so likely to have these attitudes, because they have not yet been regimented by the circumstances of life. Regimentation by one's job, church, fraternal affiliations, and the newspa-

<sup>1</sup> For further discussion of the effect of age on mental ability see Chapter Five.

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pers tends to build up mental and emotional barriers that close the mind to certain forms of instruction and make it inhospitable to new knowledge.

*Motivation.*—The factors that motivate adults to attend extension classes may operate either to increase or to decrease interest in learning. Some adults have the hunger for knowledge and understanding; others are impelled only by a desire for university credits. The latter incentive is not often conducive to learning. School-teachers who are forced to attend class in order to earn necessary credits are hardly in a mood for engaging in study. University instructors state, however, that a substantial proportion of the adults who are compelled to take courses actually become, in time, enthusiastic and earnest students.

Further information concerning the effect of motivation upon adult learning is found in the opinions of some instructors of public speaking who believe they can modify the speaking habits of middle-aged adults as easily as those of typical college students. "It is a matter of motivation," say these instructors.

With the exception of a few groups, mature adults who come to classes have more vital aims and a more compelling motivation than younger college students. Whatever disadvantage the older adult may have because of fixed habits is probably canceled by his earnest desire to improve.

*Experience.*—Many adults attending extension classes have backgrounds which not only provide a stimulus

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for study but which also aid in appreciation of the courses. For example, there are some who have traveled in foreign lands and come to take courses in anthropology for interpretations of what they have seen. One instructor, whose class in anthropology included persons who had been in Mexico and Peru, stated that they learned to interpret, organize, and integrate their knowledge better than less experienced students in their late teens or early twenties. Similarly, mothers who attend classes in child psychology are highly motivated and have had practical experiences that are valuable for an understanding of the course.

Experience admittedly is an advantage to the extent that it vitalizes and gives purpose to education. An experienced person is likely to associate what he studies and hears discussed in the classroom with his personal experience. His experience renders the instruction more significant. On the other hand, however, adults' previous experiences and associations often hinder their assimilation of new knowledge. Experience, by restricting abstract thinking, may sometimes produce a disinclination to learn theories and general principles. From the academic point of view, it is desirable for students to learn theories and principles and broad generalizations so that they will be equipped to make wider applications of knowledge and to see its more extensive implications.

The differential effect of experience and maturity on learning ability and interest is shown by the nature of the work in which extension students are superior and



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of that in which residence students are superior. It is evident that some courses of study are more closely allied to life and experience than are others. Hence, in a systematic consideration of this topic several questions must be asked. Are adults superior in the realm of applied knowledge and weaker in theories and principles? Are younger full-time students superior in the so-called disciplinary subjects?

Most instructors state that experience and maturity produce both good and bad effects on the interests and abilities of extension students. For example, older adults who come to class after their day's work are more interested in applied knowledge than in theories. They react more enthusiastically to the specific and practical than to the general and theoretical. The learning of theories and abstract materials is likely to require memorizing, which they avoid, but they learn the more practical subject matter because they associate it with their own experience.

Adults are superior in courses closely allied with the work in which they are employed. Teachers do their best work in courses that pertain to teaching methods and curricular problems; accountants and bookkeepers are superior in accounting and business courses; and professional chemists excel in chemistry. In such cases, however, if methods and principles contrary to the student's practices are stressed, he finds it difficult to learn the material. In other words, adults learn when the course content is a continuation and amplification of the type of

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work to which they are accustomed; but when they must be taken to a new field through the barrier of established habits, their adjustment may be slow and their learning retarded. Furthermore, adults are not inclined to undergo the discipline of rote memorizing. They either dislike the drilling it entails or question the value of memorizing laws, theories, and principles, the application of which they do not immediately grasp. Consequently, when classroom methods emphasize the application of knowledge, extension students do better; but the younger full-time students do better on questions concerning theories and abstract principles.

For example, in a class in life insurance and real estate attended by insurance underwriters and real estate brokers, there is not much interest in theories and principles. Since the activity of these men consists of sales work and hard bargains, they cannot detach themselves from the practical and applied knowledge enough to discuss and study its theoretical aspects. They want to become more efficient by applying facts to their work. They probably do not study as much as younger students, since they expect to acquire enough in class to pay for the time and money expended on the course. They are, of course, superior to the younger students in methods and practice but inferior in learning abstract and theoretical material.

Similarly, teachers who take extension courses in such subjects as extracurricular activities or educational sociology do better than intramural students, because, as one professor indicated, they relate their study to every-

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day work and practice. Extension students in psychology are likely to be superior in the social and applied phases but not in the general and theoretical fields.

It is to be noted in this connection that there is a tendency for extension classes to be organized on the basis of individual interests. As a consequence, many extramural students are found in classes related to their special fields of work. This circumstance is, of course, conducive to high standards of achievement in those classes. One professor commented on the important contributions that a probation officer made to his class in the measurement of personality. This officer was a man of superior ability who was motivated by a special interest in the study of personality and possessed a wealth of experience from which to draw. There are many individuals like this student in extension classes. A parallel situation does not exist in the regular classes, since few residence students have had the experiences that form a rich interpretative background for their college studies.

Some instructors believe that older students tend to speak in broad generalities. They do, of course, think in terms of certain specific experiences and cases; but they are inclined to generalize, sometimes fallaciously, on the basis of their own experiences. They also tend to base conclusions on personal experience and opinions rather than on wider evidence or more extensive data. The older student has greater confidence in his own opinions than has a young student, and he tends to regard them as more valid than the contents of books; whereas a

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young college student is more likely to refer to the evidence and the sources of evidence for his conclusions.

It might be expected that in psychology, which purports to be a study of human behavior, mature students would achieve more than in almost any other subject. But teachers of psychology were almost unanimous in their belief that adults are not as teachable in psychology as are the younger full-time students. The adults' experiences during years of living have built up a tendency to interpret the subject narrowly in individual terms—to see a tree and not the woods. If these adults took several courses and studied assiduously, they might treat the subject of psychology in a more detached manner and view it with a broader perspective.

*Ability for criticism, judgment, and interpretation.*—Many professors believe that the more mature extension students are superior in judgment and critical ability to the younger ones. In fact, it is generally believed that although as a person grows older his power of memory diminishes, his judgment and his ability for critical analysis and interpretation increase. This viewpoint is encountered so frequently that its validity should be examined.

Of course, an immature person of limited experience cannot be expected to possess a sufficient background for making good judgments and interpretations. It should be recognized, however, that the judgments and evaluations of older people may often be considered superior because they are more conservative and conventional

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and *ipso facto* more acceptable. The judgments of the young may in reality be much sounder, but they may be considered inferior because they do not conform to established patterns of thinking.

It is an accepted fact that although other abilities decline with age general knowledge or information increases. If judgment and the interpretative faculties bear an important relationship to the amount of general information possessed, then it may be assumed with some chance of likelihood that these faculties also increase with age. The following reactions of extension instructors to this question may aid in clarifying the problem.

A professor of English stated that the members of his extension class were superior in understanding and interpreting plays because they had lived longer and had had more experience than students in his day classes. They could understand the significance of portrayals of life better than younger students. A professor of philosophy indicated that older students have an advantage in the study of ethics. The younger students have a very limited background to aid them in the formation of associations, and the reason that they are unable to hold what they are taught is that they are inexperienced in many fields.

It would be an interesting as well as a valuable experiment to devise a reliable series of described situations that would adequately test judgment and critical analysis, and thus make it possible to ascertain whether or not these traits actually improve with age. At present the problem remains a matter of conjecture.



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Extension divisions could institute educational service for talented adults who wish to obtain degrees without the necessity of acquiring a certain number of credits. Through a comprehensive examination service, the qualifications of such individuals could be adequately tested. If an adult demonstrated that he possessed the knowledge and ability which characterize a good graduating student, he should be granted a degree. Such a procedure would not be unreasonable, since universities now give degrees to hundreds of young people whose only claim to one is that they have spent four years in a college environment. Adults who possess the qualifications for graduation from college should also be placed in the class of the "degreed." Our concern should be not so much with how they acquired those qualifications as with the fact that they have them.

### IMPROVEMENT IN THE ATTITUDE OF EXTENSION STUDENTS

One of the most encouraging reports from university professors who have had many years' experience is that there has been a remarkable improvement in the general quality of the work of extramural groups over a period of years. Referring especially to schoolteachers, some instructors point out that when these teachers attended extramural classes fifteen years ago, their chief objectives were entertainment and credit. They were passive during the class period, for which they had made little, if any, preparation. Today their attitude is very different; they are more active in class, and their achievements are



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commensurate with general campus standards. Two decades ago there was a similar lack of interest in academic work on the part of schoolteachers and superintendents in summer school. Many of them did not allow their studies to interfere with their vocational and recreational activities. It has been said that many superintendents spent the summer at certain universities in order to have an opportunity to attend the league ball games. Great changes have occurred since that time. Now teachers and superintendents attending summer school in many universities are earnest students whose achievement is sometimes above the standards of the regular school year.

This change in attitude is explained by several factors. Instructors have undoubtedly raised the educational standards by insisting that students complete certain assigned work in order to earn their credits. Teachers and other adults have been disciplined to study, and in most states they now expect to do standard university work when they attend extension classes.

### THE CALIBER OF STUDENTS WITH BOTH RESIDENCE AND EXTENSION EXPERIENCE

An index to the caliber of some extension students is to be found in the work of residence students who have also been extension students, a number of whom are enrolled in most universities. Some have taken courses in extension before matriculating in the university for full-time programs, and others are doing extension and residence work simultaneously. Are the residence students

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with previous experience in extension classes inferior or superior to the average residence student? What is the status of those residence students who are also taking extension courses?

Data which answer these questions were obtained by comparing the average marks of residence students who had taken extension courses with the average marks of all residence students. This comparison, made in two universities, showed that the residence marks of students with extension experience were slightly above the average marks of all residence students, though not enough so to make the difference important pedagogically. It would appear, then, that students who have taken or are taking both extension and residence courses tend to keep the level of the extension student body above that of the residence student body.

This evidence reveals the unsoundness of the popular belief that the residence student who enrolls for an extension class does so because he is obliged to repeat a course or obtain some additional credits.<sup>2</sup> If this were the case, one would expect these students to be below the average—a conclusion which the collected data have not substantiated.

From the standpoint of completeness and accuracy of data, it is unfortunate that students who had taken extension courses before matriculation were not divided from those who had done extension work after matricu-

<sup>2</sup> For a discussion of different marking standards in the two types of classes, see pages 97-98.

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lation. The data we have collected indicate, however, that there are comparatively few students who do residence and extension work simultaneously. Most of those with both extension and residence experience obtained their extension credits either before enrolling for full-time work or during a period when they had temporarily discontinued their work in residence. Those students who enrolled for extension work before residence were slightly superior to the average full-time students.

### COMPARATIVE INTEREST AND VITALITY IN THE TWO GROUPS

Opinions of professors differ as to whether extension or residence groups are more highly motivated and exhibit more interest. It has been said that there is slightly less "give and take" in extension classes. "Adults are caught in the organization of the machine," is one professor's way of expressing his opinion that adults are so regimented that their vitality has atrophied. The same professor, a nationally known psychologist, says that factory workers, foremen, and employment managers are more responsive than teachers and social workers and quicker to express opinions differing from those of the instructor. On the other hand, another psychology instructor remarks that his adult students "do not stick their chins out," as do the younger full-time students. They are afraid to express their opinions lest they receive criticism for doing it ineffectively.

A professor of history stated that the instructor's con-

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trol over residence students is better than over extension students. He believes that extension students participate more actively in small classes in which a close relationship develops between the instructor and the students. Speaking of a class composed largely of schoolteachers, he said, "The old girls asked questions and maintained discussions so that there were times when I could scarcely stop them."

A distinguished scholar in the field of economics in one of the foremost universities of this country stated in the vernacular of the college student, "Residence students want their instructor to be a good guy who will wisecrack and tell stories, but the members of extension classes ride the prof." This professor also pointed out that in evaluating residence work, we must distinguish what he called the large chautauqua classes from the small scholarly ones, because it is extremely difficult to inject vitality into the large classes.

The vitality of the students' classroom activity varies according to the nature of the course; that is, subjects which fall within their experience elicit more response than those which do not. Extension students taking courses in government and similar subjects challenge their instructor more frequently and display more vigor in their classroom discussion than do daytime students, because they have a better background and wider experience.

Credit-hunting is a practice that affects the interest and vitality of both campus and extension classes. Many

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full-time students are credit-hunters who want to be distinguished by having a "college education," but who want also to avoid much of the work and discipline involved in obtaining one. In some universities many extension students are included in the credit-hunting category. Almost every instructor criticizes the work of those of his extension students whose major aim is to obtain credits. At a state university where credit-hunting was very prevalent, many of the extension students were schoolteachers. They opposed assignments, were alarmed by examinations, and wanted to get the necessary university credits by mere class attendance. They were almost devoid of the attitudes and the habits of disciplined study that are characteristics of good scholarship.

The fact that many of the teachers who attend classes do not seem to be interested in the classwork raises a question concerning the quality of the instruction they receive. Indeed, it might reasonably be assumed that if experienced people manifest little or no interest in their classwork, the work is impractical and uninteresting and creates no incentive for learning. This assumption would be more acceptable if it were not for our knowledge of the habits and attitudes of adults. The lack of enthusiasm on the part of many schoolteachers taking extension classes is caused by their failure to give themselves up to the regulations that are a part of the discipline of every scholar. They are not in the habit of studying, and their thinking powers have been devitalized by the routine of their own classroom work. Interest and effec-

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tive habits of scholarship cannot be developed by depending entirely on a spontaneous response to interesting and stimulating teaching. It may often be necessary to use compulsion with those who are just resuming college study.

There are, however, more opportunities for the creation of interest and vitality in extension than in typical campus classes. A good example of a strongly motivated class whose members had a living interest in the work was found in the University of Tennessee at Knoxville. Because the Tennessee Valley Authority project made available a convenient source of cheap electricity, women of that city were interested in the possibilities of complete home electrification. In an extension class they studied the many uses of electricity in the home as well as the equipment necessary for utilizing it. Women who are thinking about installing an electric refrigerator or electric heating equipment are eager to acquaint themselves with the principles of its operation, its merits, and its defects. And they learn incidentally an appreciable amount of physics and chemistry which they could not and would not learn if those subjects were taught formally.

Certain state-wide projects tend to motivate many teachers to take extension courses. In several states where the elementary- and secondary-school curriculums are being revised, the universities cooperate with the state departments by offering courses on the curriculums and their revision. Teachers are motivated to take the work



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in order to acquire a better understanding of the new curriculums.

The work of some courses is vitalized by basing them partly on previous surveys. If university faculty members conduct a school survey in a certain community, they offer courses which are based at least partially upon the survey and its results. The teachers enrolled for the course participate in the classwork with much understanding and interest. As a consequence, they are well informed concerning the progress of the survey and are equipped to put its recommendations into practice.

In one state where the growth and improvement of the schools were being stimulated by new state laws, the teachers were eager for information and methods "for turning the corner in this new movement." In this particular state there had been an educational renaissance, so to speak, and the teachers were eager to receive instruction.

There is a difference of opinion on whether or not adults are willing to engage in the rigorous work entailed by education. Some instructors have found that adults prepare their themes, reports, and drawings and write their examinations more carefully than do younger students. Other instructors assert that the full-time students work harder and are more attentive to academic chores. The members of some extension classes do little systematic work, but attend class to derive from it what they can. There is nothing in the psychology of adult motives and interests, however, to prevent adults from studying

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and engaging in the activities which are symptomatic of good scholarship. The habits of adults may be restrictive, but their motives should not be. The problem is one of teaching methods, for clever teachers can encourage adults to engage in good scholastic practices.

### ADAPTING COURSES TO EXTENSION CLASSES

As we said, it was difficult to obtain comparable classes for this section of our study because so few extension classes paralleled residence classes. Instructors usually make changes in their regular courses when they offer them to adults, but these alterations should not be disturbing unless they lower the educational standards. Indeed there would be real cause for concern if typical courses were offered to extension students without modification. Instructors change their courses because they realize that adults are different from young people. Some instructors, especially in the applied fields, recognize that adults come to class with special interests and experiences, and they orient their teaching accordingly. Others place less emphasis on the direct teaching of the factual elements and feature criticism and evaluation instead, thus employing the problem and project method rather than mere memorization. Consequently, the course of study and the examinations are often not the same in extension classes as in similar campus classes. Departure from usual methods in adjustments of this kind are to be commended. They constitute good educational procedure.

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### MARKING STANDARDS IN EXTENSION CLASSES

Does a mark of C have the same significance in an extension course as in a comparable residence course? Has an extension B the same value as a residence B?

Our analysis of marking standards indicates that grades received in extension classes often are not comparable to similar grades received in residence classes. Instructors mark extension students approximately half a grade higher than regular students. The quality of work for which the full-time student receives a C is usually rated C+ or B in extension, and B work according to campus standards will probably be rated as high as A in extension classes. The records of students who have done both extension and nonextension work show this tendency for the extension marks to be noticeably higher. Ordinarily, then, it is less difficult to obtain high marks in extension classes than in nonextension classes, and it is therefore unsound to evaluate the quality of extension work by comparing extension and residence marks.

This tendency to mark extension students more liberally than those in residence results in part from the nature of the financial administration of extension divisions, which, in many universities, are largely dependent upon students' fees for support.<sup>3</sup> This gives the extension student, superficially at least, a strong position and the extension division a weak one. The extension student is regarded somewhat as a customer; the instructor is dependent upon him for his financial compensation, and

<sup>3</sup> For further discussion of this problem, see pages 107-09.

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the extension division needs him in order to continue "in business." Since a student is pleased by high marks and displeased by low ones, he is more likely to continue the course if his marks are satisfactory. The instructor will probably have more and larger classes from term to term if his "customers" receive satisfactory marks. Consequently, the teachers of extension classes do not wish to offend their students by giving them average or low marks even though they deserve them.

Although this condition in itself is not serious, it is symptomatic of a situation that is not conducive to the best instruction. It is really of little import that extension students be given a B when they actually earn a C, except when this causes the college or university to discriminate against extension credits. Even then the generous marking affects only a few individuals, since most extension students take only one or two courses. And those adults who enroll for courses over a period of years are generally the superior students. It is obvious, however, that the expectation of "easier" marks attracts some students who want to get university credit as easily as possible. Such a situation is certainly not likely to raise educational standards. More liberal grading in extension divisions will eventually lower both the standards of instruction and the caliber of the students attracted.

### EVALUATING ACHIEVEMENT IN EXTENSION CLASSES

Even if we continue to find that extension students do as well as residence students in terms of examination

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scores, we still need to examine critically the ultimate educational results. Since the advent of the examinations described as the objective or new type, many attempts have been made to evaluate the results of education and the effectiveness of teaching. It is evident that the extent to which students can recall factual information or reproduce the ideas of instructors can best be tested by means of true-false, multiple-choice, matching, and similar tests. Those abilities may be very important (although they have been overemphasized) but do they represent ideally what we are attempting in education?

The results on examinations often do not reflect the quality of teaching; indeed, inferior teachers may be satisfactory according to the examination scores of their pupils. A teacher who confines himself to the textbook, concentrates on the bare facts, drills, and teaches with a view to the examinations will obtain better results, judging by the scores of his pupils, than a superior instructor who elaborates, takes occasional side excursions, and emphasizes the educational processes in which his students engage. The second instructor will do much better teaching, but his students may not obtain such high scores on objective tests composed of multitudinous scrappy, factual elements, many of which are unimportant.

I doubt that very much significance should be attached to an evaluation of educational outcomes based on examinations of achievement. Acquisition of the contents of a course has some importance, but if we make such

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achievement our objective and standard, we overlook more important purposes of education, especially adult education. One professor who was asked to report on a pair of comparable classes included in his reply this statement: "My philosophy of education is such that I do not work for subject-matter results and do not give subject-matter tests except for purposes of demonstrating their futility."

Our aim should be to teach in a manner that will lead students to weigh and evaluate knowledge rather than merely to cram it into their minds for a very temporary stay. It is more important that students should be stimulated to continue their scholarship after they leave the classroom than that they should acquire an extra unimportant fact or two that will be quickly forgotten. Our philosophy should be similar to that of the Danish teacher of gymnastics who replied to the admiring comments of visitors that his methods were guided more by a concern for the physical education of his students after they had left his gymnasium than by a desire to see them perform well while they were under his immediate direction.

There is danger that the skeptical attitude of the so-called regular staff toward the standards of extension or night-school work may cause it to be molded according to the pattern of campus instruction. That is, extension divisions may aim first to duplicate day-school methods, standards, and subject matter, and then seek to prove that the extension work is on as high a level as that of the university as a whole. It would be detrimental to good



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education if educational standards were established so uncritically. First we must prove that extension students' abilities and achievements are on the college level. When that fact has been established, we should free ourselves from academic prejudices and set out to attain the true objectives of adult education.

Our purpose should not be to impose campus methods and content on extension students but rather to give them the best education the university can offer. Our data show that the abilities and achievements of extension students give the professional guardians of university standards no reason to fear that the admission of adults to credit courses will result in the disintegration of the "great and fundamental" purposes of the university. Those in charge of extension work should pioneer in the field of good college teaching, for extension students require such teaching. If the university's best instructors and equipment are made available for the extension students, there need be no concern for the educational results.

Although this discussion may have concentrated our attention on credit courses, we should not overlook a more important phase of extension instruction, the non-credit work. The discussion has thus far been devoted to credit work because important questions have been raised in regard to the classroom achievement and quality of extension students. As a matter of fact, it is educationally desirable to divorce ourselves from overemphasis on credit work and set out to do some real adult education.

### TEACHING METHODS, PROBLEMS, AND PERSONNEL

THE achievement of extension students depends to a certain extent upon the quality of the instruction they receive, which in turn is contingent upon the methods used, the caliber of the instructors, and the equipment and facilities available for both instructors and students. Some of the matters discussed here are based on the opinions and experiences of extension teachers and directors; others rest on more or less objective data.

#### TEACHING METHODS

An important problem of extension education concerns the teaching methods used in extension classes as compared with those employed in residence classes. By interviewing and observing many extension instructors at various universities throughout the United States, numerous examples of the methods in use by different instructors and of differences between the residence and the extension methods of teaching were obtained.

As we have pointed out, the content of many courses as well as the methods of teaching are modified for extension classes.<sup>1</sup> It is relevant to ask whether this modifica-

<sup>1</sup> See page 96.

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tion is always in the direction of better instruction and superior results. No doubt some instructors change their courses in order to "soften" them for extension students and thus require less work both from themselves and from their students. On the other hand, changes may be made in order to adjust the instruction to the particular needs of extension students. Obviously, changes made to fit the special capacities, interests, and experiences of the students are good pedagogy. If instructors limit the course content and teaching methods of their extension classes to those of their day classes, they are overlooking some excellent opportunities for teaching of superior caliber and effectiveness.

The reaction of a certain professor to the request that he give the same examination to both his residence and his extension classes furnishes a good example of desirable modification. He replied that he would do so, but that he did not wish to be restricted in his teaching by the examination. The methods used in his two classes are so different that any comparison based on examinations would not be valid. This professor, who, incidentally, is distinguished in his field, explained that in extension courses he relates the classwork to the individual interests and purposes of the students. He tries to adjust his teaching so that it will stimulate the students to seek the solutions of problems after the course has been concluded. He concerns himself with developing their interests and encouraging them to undertake wide exploration. These ends would be difficult to attain if his teaching were

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formal and his students were held accountable on an examination prepared before the course was under way.

Another professor states that his major aim in the instruction of extension students is to aid the individual. This statement gives a clue to his mode of teaching. An instructor in chemical engineering emphasizes individualized instruction because the members of the class have diverse experiences and positions and come to him with different problems to be solved. This instructor also aims to interest his students in self-improvement and in keeping abreast of the large amount of new knowledge accumulating in their field.

In a state where mining opportunities attract the attention of many prospectors, there is an interesting class in which "school consists of answering questions which are asked." On Sunday afternoons a geologist meets with the miners who "come out of the hills" to attend this "miners' clinic." Bringing their materials with them from the hills, they ask questions and discuss problems from two o'clock till dark. Then they return to the hills, taking with them the instructions they have received. Experience and a practical motive create in this instance a very desirable educational situation. Too often, in contrast to this case, students do not carry the benefits of instruction out of the classroom.

The individualization of instruction to meet and solve the students' practical problems is becoming a frequent practice in extension work. A distinguished psychologist remarks that spectacular illustrations are necessary for

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holding the interest of his extension students. Experience in the subject and facility in applying its principles are also required. A professor of public speaking states that to teach his subject to extension students he has to keep up to date on current topics and be acquainted with many fields, because his adult pupils are familiar with a very wide range of topics.

According to one professor, it is impossible to extemporize in extension classes because there are too many critical minds among the students. Pedagogical methods used for freshmen are unsatisfactory with these older students, and relating the subject matter to current problems by more informal teaching methods is desirable.

A professor of history, instead of asking only for facts and subject matter in an examination, required his extension students to prepare a paper showing the relation of the eighteenth-century philosophers to the present. This gave them an opportunity to exercise their powers of comparison and interpretation. A similar method is employed by a professor of sociology, who asks the members of his classes to make sociological studies or surveys of the communities in which they live. They are also requested to formulate conclusions, interpretations, and recommendations on the basis of their findings. An instructor in literature asks for some facts in his examination but includes questions requiring criticism, interpretation, and evaluation. This encourages his class to study literature on a higher plane than would be possible if teaching were confined to mere facts.

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Projects that permit teachers and superintendents to study the problems of their own schools are emphasized by a professor in education, who says that his classrooms are used in part as laboratories in which students experiment and apply knowledge gained from study. When residence students and teachers in service are members of the same class, the residence students are paired with the teachers so that they may have an opportunity to relate theoretical subject matter to actual situations in the field.

The consensus of opinion among extension instructors is that if classes become too technical numerous adults do not comprehend the material, and if they become too theoretical many lose interest. Most extension instructors, therefore, deem it advisable to adjust instructional methods to the interests and experiences of their students. This attitude was epitomized by a professor who, speaking figuratively about extension teaching, said, "We don't teach the theory of currying horses; we go out and curry the horses."

Many instructors have found that it is necessary to work very diligently at the beginning of each term in order to build up momentum. Extension teaching requires "men with lots of pep" who can exert the energy to give an extension class the necessary impetus.

Since it is generally conceded that older students coming from offices, classrooms, shops, and farms should not be taught in the same manner as young inexperienced adults attending full-time classes in a university, it is encouraging to learn that different instructional proce-



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dures for the two groups are prevalent. When instructors are willing to break away from their usual methods in order to meet the special needs of adult students, there need be no concern about the quality of their instruction. Extension teaching should not be anchored to campus standards, but should pioneer in the promotion of effective teaching methods. Extension divisions should carry on in their own right and might profitably conduct research to the end of developing effective teaching methods.

### CONDITIONS THAT HANDICAP EXTENSION INSTRUCTION

*Dependence on fees.*—At present in many universities an instructor's income depends upon the number of students in his classes. Frequently he must keep the enrollment above a certain minimum in order to retain the classes, and to accomplish this he may popularize his courses or otherwise lower his standards.<sup>2</sup>

If an instructor's stipend depends upon the number of students he attracts to and holds in his classes, the students have a control over him which is not conducive to the best educational results. Students should exercise control over their instructors through requiring the instructor to satisfy their educational requirements, interest, and curiosity, but never through the instructors' dependence upon their fees. The teacher-student relationship should be one in which the student is regarded as a learner and not as a customer.

Conditions that make it necessary for any instructor

<sup>2</sup> For the effect of this situation on marking standards, see pages 97-98.

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to compromise a high quality of teaching should not exist. The instructor's only responsibility should be effective teaching. He should not need to count the noses in his class; he should rather be interested in the brains that are present. A professor harassed by the fear that his enrollment will be less than a fixed minimum is not motivated to teach effectively and may be governed by considerations other than high academic standards.

At least one major university has made extension teaching part of the instructor's regular teaching program, and the plan seems to operate very satisfactorily. If this arrangement were universally adopted, the disadvantages of the teacher's dependence upon students' fees would be eliminated. All classes, except for those held out of town, would then be open to both residence and extension students. The extension student would no longer be regarded as a customer for whom the instructor must, so to speak, make a bid. Furthermore, if extension classes, especially the credit courses, were included as a part of the instructor's normal load and were so arranged that both extension and residence students could attend, sufficiently large classes would be practically assured, so that the instructor would not have to worry about losing students and could therefore raise the quality of instruction to a higher level.

It might be objected that under such an arrangement the more influential faculty members would avoid extension teaching if they did not like it. Such evasion might occur, but the advantages gained by the plan would out-

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weigh this disadvantage. No difficulties of this kind are experienced in the university referred to.

*Lack of library and laboratory facilities.*—Another handicap to effective extension teaching is the prevalent lack of adequate library facilities. Many instructors mention this as the most harassing problem connected with extension teaching. It is most serious when classes are held in small communities where the libraries contain very little academic and professional literature. In some instances the class assignments must be limited to a few texts.

The lack of necessary apparatus and laboratory materials is also a serious problem. It is impracticable to give demonstrations and laboratory work in fields which require complicated and expensive pieces of apparatus unless the classes are held on the campus. It is difficult, if not impossible, to teach some of the courses in the natural sciences, psychology, and drama off the campus.

The problem of providing ample reading material for nearly all classes is far from unsolvable. In a few universities the division administrators are determined that library facilities for extension students shall be adequate. The instructors have been informed that any reasonable request for books and reference material will be granted. In fact, the extension administration in one university takes pride in furnishing library facilities for its students equal to those for residence students. As a matter of fact, the extension students there have easier access to reference material than the students on the campus, and

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the instructors are enthusiastic because their work is not restricted by a lack of study materials.

Thus, by spending the amount of money necessary for reference material, extension directors could minimize, if not eliminate, one of the major handicaps of extension teaching. It would certainly be a good policy for extension directors to set aside in their budgets sums of money which instructors would be encouraged to use for the purpose of buying books and reference material. This problem is so important that administrators should take the initiative in providing adequate library materials, and not wait for the insistent requests of the extension faculty.

*Students' lack of time.*—Most extension students are employed full time, and both students and instructors say that lack of time impedes scholarly activity. Those who attend extension classes are usually among the most ambitious of the employed, and they undoubtedly spend more energy on their work than do the average employees. Furthermore, nearly all workers are required to put forth more effort at their jobs now than in predepression days, and those who add academic work to their full-time occupations commit themselves to a very arduous program.

Many who attend extension classes are tired and without enough leisure to do university work that satisfies them. Their achievement may be adequate according to university standards; but it still may not be satisfactory to them, for they prepare their lessons while harassed by

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the pressure of other duties and obligations. Lack of time, then, is a serious obstacle in extension work, and it appears at present one very difficult to overcome.

Lack of time is also often the cause for the lack of continuity in the extension students' courses. Having so little time to devote to study, they must spread their work, often very haphazardly, over a long period of years, which may involve considerable waste of time and energy in repetition and review.

*Long class periods.*—The objection has frequently been raised that the typical extension class periods of two or three hours' duration are too long, because they are tiring to both instructor and student. There is less objection on this ground to the two-hour than to the three-hour period. The long period has some advantages, however, one of which is that a single long period is more convenient for the extension student than several shorter periods necessitating more trips to class each week. Nor would it be very economical for an instructor to make more than one trip a week into an off-campus community.

Moreover, the long single period is desirable for adults, because it requires more independent work of them. When class meetings are less frequent, the students are left to their own resources for longer intervals. With more frequent meetings students become more dependent upon the instructor than is to their best advantage. It is conceivable that students could do their best work if they met the instructor only when they needed his

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help. With two-hour classes the meetings are certainly frequent enough for the students to obtain any aid they may need.

Obviously, the relative educational value of the long and short class periods should be the most important consideration. By giving objective examinations to comparable groups one might discover that students attending class for a three-hour period achieve as much as those attending class for three one-hour periods. On the other hand, psychological experimentation on the length of work periods has demonstrated that moderately short periods are more effective than long ones.

But the most significant evaluation of long and short periods is made on the basis of the reactions of the instructors and students themselves. If they believe that they are fatigued by the long period, that there is a lack of interest during the latter part of it, and that the long period produces a dislike for or dread of the classes, then there is sufficient evidence that long periods are unwise.

A skillful instructor, however, can vary his work during a two-hour period in such a manner that attention will be reasonably well maintained. There are not many instructors who can lecture effectively for a two-hour period, and fewer still can maintain good attention or stimulate active participation for a three-hour period. During the longer periods, there should be some well-balanced combination of lecture, recitation, and general discussion in order to avoid tiring both instructor and students.



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### THE EXTENSION STAFF

The success or failure of a class depends very largely upon the capabilities of the students attracted into it, the time of day it is offered, the conditions and equipment of the classroom, the length of the class period, and the size of the class. But more important, perhaps, than any of these is the quality of the instructor. Hence, the caliber of extension staffs merits careful consideration.

Commenting on the characteristics of the extension staff, Cartwright makes this challenging statement:

Broken-down and unsuccessful professors are still shunted into academic and administrative posts in university extension, where they prove quite inadequate to the exacting instructional and other tasks that confront them there. Such men evolve few plans and are content to coast out their existences. They prove easy prey for alert young academic charlatans who seem to be attracted to extension divisions because of their publicity possibilities. Such men, usually possessing degrees but without education in the real sense, cause university extension divisions to attempt flashy, superficial, and undignified activities, cheapening to the name of the university they represent. There is thus a vicious partnership resulting in harm to universities and to adult education. It will not be remedied until wise university administrators divert faculty men of the highest standing into the study of university adult education and teaching problems.<sup>3</sup>

This statement should be interpreted in terms of the different types of extension teachers. The extension staff may be divided into two categories which should be dis-

<sup>3</sup> Morse Adams Cartwright, *Ten Years of Adult Education* (New York, 1935), p. 190. By permission of the Macmillan Company, publishers.

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tinguished from each other: (1) the permanent full-time staff, which generally includes a director, an assistant director, a secretary, some stenographers, heads of various bureaus or departments, division officers in various centers, and, in some universities, a few regular extension instructors; (2) the extension staff of part-time instructors who are faculty members of the various colleges of the university. In most universities much of the extension teaching is done by members of the university faculty selected by the extension director.

The writer is convinced by his findings that Mr. Cartwright's statement is not accurate if it is intended to apply to the extension instructors selected from the various college faculties. No specific evaluation of the extension staff proper has been made, and the following consideration or estimate of extension instructors refers to the staff selected from the college faculties.

*Qualifications of extension teachers.*—Before attempting an evaluation of extension teaching, we must consider the criteria by which we judge instructors effective or inadequate. We might say that the superior instructors are those who know their techniques and subjects, who are interesting, tactful, patient, sympathetic, enthusiastic, and cooperative. This description is not very enlightening, however, for these desirable traits are so universally important that successful bank clerks, brokers, actors, and waitresses, all possess them. It is obviously futile, then, to attempt to evaluate a teacher on the basis of his personal attributes alone.

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University professors are not formally rated, but they soon achieve a reputation through the reactions of their students and their colleagues. Students' reactions to an instructor are probably as reliable an index to his effectiveness as anything else. If students are genuinely enthusiastic about an instructor, it is usually safe to assume that he has good qualities, and if they are passive or negative in their reactions to him, that he is mediocre or poor.

There are, of course, other means of estimating the worth of teachers. We may question the reliability of evaluating them in terms of campus standards. Are good campus teachers also good extension teachers? Or does superior extension teaching require different qualities than superior campus instruction?

There is a prevalent misconception that a successful extension teacher does not belong to the same academic species as an effective campus teacher. As a matter of fact, the qualities that contribute most to effective campus teaching will also be found in the capable extension teacher. An individual who is sincere, interesting, and in rapport with his students is a successful teacher, whether of older or of younger people. Effective extension teachers are also competent campus teachers, but a mediocre campus instructor is probably a poorer extension instructor.

The dean of a liberal arts college says that some really good campus teachers may not be effective in extension classes because extension teaching precludes the use of

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the compulsion method. He points out that in typical university classes the laughter and derision aroused in the class by a student's failure in recitation serves as a coercive instrument in the hands of the instructor. Ridicule and compulsion methods cannot, however, be used successfully in extension classes; in fact, it is very doubtful whether they are expedient even for freshmen. The extension instructor must employ other techniques, which are probably superior to coercive tactics. Thus, a teacher apparently successful on the campus may fail in extension work because his compulsion methods will not work.

Nevertheless, it should not be difficult to obtain good personnel for extension service if the best campus teachers available are selected. Some ineffective instructors may be chosen, but their failure to illuminate a class cannot be hidden under a bushel. Their deficiencies will soon be exposed, for teachers are doubly proved when they engage in both intramural and extramural teaching. Those who clearly demonstrate their merit in one form of teaching will usually evince equal ability in the other, and when the caliber of an instructor is not definitely known, it can probably be determined by his degree of success with extension students.

There is also prevalent the fallacy that good scholars or research workers are not effective extension teachers. It must be recognized, of course, that good scholars are not always good teachers and that men who are poor instructors for large undergraduate classes may be excel-

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lent for small classes of graduate students. Workers on the frontiers of knowledge are often the most effective teachers of advanced students, and research workers are frequently very popular with extension students, since adults are usually interested in experiments and investigations. Several instructors have stated that their extension students listen attentively to thorough descriptions of scientific experiments and are stimulated by what they have heard to make inquiries. Thus, contrary to the general belief, a research worker often finds among extension students an audience eager to hear about the work he is doing.

*Evaluations of extension instructors.*—In a few institutions the cooperation of the college deans and particularly of the department heads was requested in an attempt to evaluate the extension instructors systematically. Each department head and dean was asked to compare those of his staff members who taught extension courses with his faculty as a whole. The comparisons were made on two bases: (1) productivity, research, or scholarship, and (2) teaching ability. No elaborate rating schemes were employed, however, and the conclusions were drawn solely on the basis of judgments obtained from deans and department heads.

According to these evaluations the instructors who teach extension classes are somewhat above the average of the faculty of their respective departments both in scholarship and in teaching ability. Because superiority in research and teaching ability tend to go hand in hand,

TABLE 9.—RANK AND DEGREES OF COLLEGE FACULTIES AND OF  
THOSE SELECTED TO TEACH EXTENSION CLASSES IN UNIVERSITY A

Rank	Liberal Arts				College of Engineering			
	Residence		Extension (from residence)		Residence		Extension (from residence)	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
Dean .....	1	7	..	...	1	2.5	..	...
Professor .....	32	23.5	..	...	9	22.5	3	42.9
Associate pro- fessor .....	27	19.9	1	7.1	8	20.0	3	42.9
Assistant pro- fessor .....	33	24.3	6	42.9	6	15.0	1	14.3
Instructor .....	43	31.6	6	42.9	16	40.0	..	...
Assistant .....	..	...	1	7.1	..	...	..	...
Total .....	136	100.0	14	100.0	40	100.0	7	100.1
Degree								
Ph. D., Sc. D. ..	46	33.8	2	14.3	1	2.5	..	...
M. D. ....	3	2.2	..	...	..	...	..	...
M. E. ....	..	...	..	...	9	22.5	..	...
E. E. ....	..	...	..	...	10	25.0	1	14.3
C. E. ....	..	...	..	...	7	17.5	1	14.3
M. S., M. A. ....	64	47.1	10	71.4	6	15.0	5	71.4
B. A., B. S. ....	20	14.7	2	14.3	6	15.0	..	...
No degree .....	3	2.2	..	...	1	2.5	..	...
Total .....	136	100.0	14	100.0	40	100.0	7	100.0



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we have some corroboration of the belief that these two abilities are often found in the same person. It is particularly noticeable that the best creative scholars are usually the best teachers when teaching ability on the graduate level is the criterion. But the same condition prevails to a considerable degree on the undergraduate level also, though it is not so apparent there.

The extension instructors were further evaluated by comparing their degrees and professional rank with those of other members of the college faculties from which they were selected. There are dangers in comparisons of this kind, since individual superiority cannot be determined on the basis of academic degrees and university rank. Some instructors having only M. A. degrees are undoubtedly better teachers and finer scholars than some full professors with Ph.D. degrees. On the whole, however, faculty members in the upper ranks are superior to those in the lower, and those with the highest academic degrees are superior to those with lower degrees.

The results of the investigation indicate that in some institutions the extension faculty is composed of a large number of professors and department heads, while in others there is a tendency to select instructors with lower degrees and rank for extension work. Even in the latter instances the extension faculty includes some of the most eminent professors, though the number of these is scarcely proportionate to the total number on the campus.

In the engineering college for which the data are given in Table 9, the extension teachers are of higher academic

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rank than are the members of the residence faculty; and though it is difficult to compare the different engineering degrees, the two groups seem to be approximately equal in that respect.

This is not true in the liberal arts college of the same institution. There the extension men are lower, on the average, both in rank and in degree than the members of the faculty from which they are drawn. There seems to be a tendency to choose men from the middle ranks and with master's degrees to teach extension classes. In this same college, however, the department heads judged most of the men who were teaching extension classes to be above the average of their departments in teaching and research. We must conclude, then, either that the present method of determining academic rank is not valid or that the judgments of the department heads are faulty. In either case, it is conceivable that if the extension director selected judiciously, he could pick men who did not rank above the average academically but who would be superior teachers.

Much of the extension teaching in the university represented in Table 10 is done by persons who do not hold university appointments but teach one or more extension courses. Extension teachers who are not members of the regular staff may be placed in two categories: (1) members of the faculties of other schools chosen for convenience or because of their special qualifications, and (2) persons engaged in business, dramatics, music, writing, and art. Many extension teachers belong to this second

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TABLE 10.—FACULTY OF LETTERS AND SCIENCES COMPARED WITH EXTENSION FACULTY ACCORDING TO RANK AND DEGREES IN UNIVERSITY B

	Total Faculty		Members of Faculty Teaching Extension	
	Number	Per cent	Number	Per cent
Rank				
Professor .....	80	36.5	6	17.6
Associate professor .....	30	13.7	8	23.5
Assistant professor .....	39	17.8	7	20.6
Instructor .....	19	8.7	4	11.8
Lecturer .....	33	15.1	4	11.8
Supervisor .....	18	8.2	5	14.7
Total .....	219	100.0	34	100.0
Degree				
Ph. D. or equivalent .....	149	68.0	20	58.8
M. A., M. S. ....	34	15.5	9	26.5
B. A., B. S. ....	24	11.0	4	11.8
C. P. A. ....	1	.5	..	...
No degree .....	11	5.0	1	2.9
Total .....	219	100.0	34	100.0

category and cannot justly be compared in such terms as rank and degree with professional teachers of more academic subjects. But if those from outside the academic groups are carefully chosen, they can probably give good educational service to some adult groups. In terms of the qualifications of university faculties, the teachers chosen from the professions and business may seem inadequate; nevertheless, they may actually fit very well into the program of adult education, especially in the less formal noncredit work.

Examination of Table 10 (which includes neither of the groups described in the preceding paragraph) reveals a tendency in the university to choose proportionally fewer of the highest ranking men and more from the

TABLE II.—RANK AND DEGREES OF COLLEGE FACULTIES AND OF THOSE SELECTED TO TEACH EXTENSION CLASSES IN UNIVERSITY C

	Arts and Science				Education				Business			
	Residence		Extension		Residence		Extension		Residence		Extension	
	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent	Num- ber	Per cent
Rank												
Professor .....	28	32.6	19	55.9	3	11.1	2	40.0	3	37.5	2	40.0
Associate pro- fessor .....	11	12.8	6	17.7	1	3.7	1	20.0	2	25.0	2	40.0
Assistant pro- fessor .....	14	16.3	4	11.8	9	33.3	1	20.0	..	...	1	20.0
Instructor .....	28	32.6	5	14.7	14	51.9	1	20.0	2	25.0	..	...
Lecturer .....	5	5.8	..	...	..	...	..	...	1	12.5	..	...
Total .....	86	100.1	34	100.1	27	100.0	5	100.0	8	100.0	5	100.0
Degree												
Ph.D., Sc.D., J.D. ....	34	39.5	18	52.9	3	11.1	2	40.0	3	37.5	3	60.0
M.A., M.S. ...	37	43.0	10	29.4	12	44.4	3	60.0	3	37.5	2	40.0
M.D. ....	..	...	1	3.0	..	...	..	...	..	...	..	...
B.S., B.A. ....	11	12.8	5	14.7	7	25.9	..	...	1	12.5	..	...
C.P.A. ....	..	...	..	...	1	3.7	..	...	..	...	..	...
No degree ....	4	4.7	..	...	4	14.8	..	...	1	12.5	..	...
Total .....	86	100.0	34	100.0	27	99.9	5	100.0	8	100.0	5	100.0

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lower ranks for the extension staff. Correspondingly, the percentage of extension teachers with the highest degrees is less than the percentage of the total faculty with such degrees.

From these objective data, it would seem that the less qualified men are being chosen to teach extension classes. But extension directors may be selecting the best of the men who have not yet reached the top ranks. In that case, the best of the young, energetic, still-developing men teach the extension classes, and the staff that appears weaker according to tabulations is actually superior. The judgments of deans and department heads reported above indicate that such is probably the case.

In the university for which the data are presented in Table II, it is clearly evident that men of better rank and degrees teach the extension classes. These data seem to show that there is variation from university to university in the caliber of men selected from the faculties for extension teaching.

In another university the faculties were evaluated in terms of their amount of publication. Such an evaluation is of the gross, quantitative type, and as such it may overlook qualitative features. For example, the articles of some of the staff members may be glorified pep talks printed in the organs or "trade journals" of the university or in similar journals of educational and professional groups. Such articles, though not at all comparable in value, are counted along with research articles representing the highest type of university endeavor. In spite of

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such inequalities, a comparison of the average amount of publication by the college faculties of a university with that of the members of those faculties who teach extension classes gives some indication of the scholarship of the extension teachers.

TABLE 12.—AVERAGE NUMBER OF BOOKS AND ARTICLES PUBLISHED PER MEMBER OF COLLEGE FACULTIES AND OF THOSE SELECTED TO TEACH EXTENSION CLASSES IN UNIVERSITY D\*

College	Books		Articles	
	Total staff	Extension	Total staff	Extension
Science, Literature and Arts..	.96	1.06	11.00	7.37
Education .....	2.20	.88	10.31	3.00
Business .....	1.85	.34	7.36	4.71

\* Assistants have been omitted from the calculations.

This table is read as follows: The average number of books published for the eight-year period is .96 for each member of the Science, Literature, and Arts faculty, and 1.06 for each member of this faculty who teaches extension classes. The table is read similarly for the number of articles and for the other colleges.

Table 12 shows the average amount of publications of the faculties over an eight-year period, and Table 13 gives their rank and degrees. The data in these tables show that there is considerable variation from college to college in the apparent quality of the extension staff. Those faculty members selected for education and business classes are not such productive scholars as the faculties as a whole. The differences would be even larger if those teaching extension classes were not included in the whole faculties. The comparison is between a part and a whole that includes the part.

It is interesting to note in Table 13 that in education



TABLE 13.—RANK AND DEGREES OF COLLEGE FACULTIES AND OF  
THOSE SELECTED TO TEACH EXTENSION CLASSES IN UNIVERSITY E\*

Rank	Science, Literature, Arts						Education						Business					
	Residence			Extension			Residence			Extension			Residence			Extension		
	Num- ber	Per cent	Per cent	Num- ber	Per cent	Per cent	Num- ber	Per cent	Per cent	Num- ber	Per cent	Per cent	Num- ber	Per cent	Per cent	Num- ber	Per cent	Per cent
Professor .....	46	32.8	10	11.9	17	20.0	1	13.0	9	27.0	3	8.0						
Associate pro- fessor .....	16	11.4	8	9.5	10	11.0	..	...	1	3.0	5	13.0						
Assistant pro- fessor .....	28	20.0	29	34.5	11	12.0	3	37.0	3	9.0	3	8.0						
Instructor .....	50	35.8	37	44.0	50	57.0	4	50.0	20	61.0	27	71.0						
Total .....	140	100.0	84	99.9	88	100.0	8	100.0	33	100.0	38	100.0						
Degree																		
Ph. D. ....	..	...	47	55.9	26	30.0	2	25.0	11	33.0	9	24.0						
M. A. ....	..	...	28	33.2	35	39.0	4	50.0	15	46.0	10	26.0						
B. A. ....	..	...	7	8.3	26	30.0	2	25.0	7	21.0	10	26.0						
No degree .....	..	...	2	2.4	1	1.0	..	...	..	...	9	24.0						
Total .....	..	...	84	99.8	88	100.0	8	100.0	33	100.0	38	100.0						

\* Assistants have been omitted from the calculations.

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and business the extension instructors do not have as high rank as the members of the total faculties, and that in this situation there seems to be a direct relationship between rank and productivity. The extension teachers tend to be of lower rank, and they write fewer books and articles.

Because of the variation from university to university and also among the colleges within a university, it is difficult to discover whether the extension instructors are equal to the faculties from which most of them are drawn. It is very probable that in some universities the extension faculty is made up of the best of the residence faculty, while in others it is not.

It is obvious that any attempt to determine the relative qualities of faculties statistically or by tabulations is hampered by very serious limitations, but if we find that some extension faculties consist of the men in the lower ranks who publish the fewest articles and books, we are justified in questioning the quality of those extension staffs. Of course, if the faculties are not found adequate when evaluated according to objective methods, there should be other reasons or explanations to account for their selection.

*Factors affecting the selection of the staff.*—The director of an extension division is ordinarily responsible for the selection of part-time instructors from the various college faculties. It behooves him to obtain the very best instructors available in order that extension students may be stimulated to achievement. Consequently, state-

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ments of extension directors in regard to the caliber of the extension staff should be particularly interesting.

The extension director of one large university stated that although the best of the older faculty members were not always available, he could, with few exceptions, obtain the best of the young and middle-aged instructors. The older men do not have sufficient energy or vitality for the traveling often entailed in teaching extension classes. This is not a general loss if the best of the younger instructors can be obtained, since they probably do superior teaching. The general evidence concerning adult abilities suggests or implies that one may expect the best instructors under fifty years of age to be superior to the best ones over fifty. Since the director just referred to is able to offer excellent remuneration for teaching extension classes, he can command the services of the best instructors of the university.

According to the extension director of a southern university, almost all faculty members are willing to teach extension classes. His aim is to select mature instructors of high scholarship who are competent and interesting lecturers. He remarks that it would be a poor policy to give the public inferior extension instructors by whom to judge the university. Another director believes that the exclusion of inferior professors is more important than the selection of superior ones.

Some faculty members seek appointment to the extension staff because of the additional financial compensation they will receive. These instructors are probably

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inferior in scholarship to those who are so occupied with their residence teaching, research, and general university and public service that they consent to conduct extension classes only when requested to do so.

The head of the history department of a university in which the extension teaching is generally done by the more successful professors stated that they are reluctant to teach extension classes because the compensation is inadequate. He pointed out further that in his department extension teachers were, on the average, inferior to the rest of the staff, since his less successful instructors taught extension classes in order to increase their incomes. This man suggested that extension classes should be included in the instructor's teaching program and considered a part of his regular work. Then additional remuneration would cease to be a factor in the problem, and the best instructors could be selected to do at least the major part of extension teaching.

At present, however, the remuneration provided is an important factor in the problem. In some universities, the compensation is so inadequate that the superior instructors will not accept extension work. Payment for extension teaching is judged by staff members in terms of their respective salaries. In universities where salaries are high and interest in research is predominant it is difficult to obtain the services of the superior instructors, since they do not consider the work worth their while. On the other hand, when salaries are low or only moderate even the prominent professors are interested in supplementing their incomes by extension teaching.

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It should not be inferred from this discussion that the professors receiving the highest salaries are necessarily the best scholars and teachers in the university, though for the most part they probably are. The selection of the best of the younger instructors, who are usually willing to teach for the stipend offered is, as we have pointed out, very desirable from the viewpoint of good extension instruction. It might be questioned, however, whether it is advisable for these young instructors to dissipate their energies by increasing their teaching program. In any case, it is obvious that the remuneration involved is likely to be of considerable importance in determining the quality of extension faculties.

The policy of the extension director is another important factor in the selection of extension instructors. If he insists upon accepting only the very best professors the general caliber of the extension faculty will be raised, but if he takes mediocre instructors the faculty will be maintained at a "tolerance level." There is undoubtedly a movement toward improvement in adult education on the university level, and directors of extension could give it impetus if they were alert to their opportunities for selecting the best scholars and teachers from the various faculties.

For some types of extension instruction only the best teachers can be employed. This is the case when the students are practicing engineers, graduate chemists, school superintendents, and classroom teachers who are taking graduate or advanced undergraduate work. Only members of the faculty who rank high in research and class-

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room ability are successful with such students. For more elementary classes and for some noncredit work, teachers who are capable though not superior in scholarship may conduct the work satisfactorily.

There is a tendency to select teachers who are very proficient at the freshman level but not at the graduate level for at least part of the extension work. A statement to this effect was made by a department head in a university where the extension work in one college was conspicuously successful because the best instructors of that college were teaching the courses in the technical fields. In fact, these classes could not have been conducted by any but these superior teachers.

Still another factor that affects the selection of extension instructors is the attitude of the administrators toward extension work. In some universities the college deans and department heads do not favor allowing members of their staffs to teach extension courses, except for the young, inexperienced graduate students who need to supplement their inadequate incomes and who will profit from the teaching experience, or for instructors who are destined to have little or no success in their respective departments. Other administrators minimize teaching and encourage their faculty members to undertake intensive research. Consequently, they disapprove of any such increase in the teaching load of their men as the addition of extension work.

Finally, the class level of extension work influences the selection of the faculty. For freshman and sophomore



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work instructors of moderate experience and scholarship suffice. On the more advanced undergraduate level better instructors are necessary, and for graduate work only the very best will do. Consequently, there is a tendency for the scholarship of the instructors to correspond to the scholarship level of the extension groups. If most of the extension courses are of junior college level, the extension staff may be of lower average caliber than the entire university faculty. Conversely, the instructors selected to conduct more advanced courses for members of the various professions will be above the general average of all faculty members. This situation is not extremely serious, however, for the instructional results seem to be satisfactory.

*The effect of extension experience on the instructors.*—

It is generally recognized that an individual develops most fully when he is nurtured by a variety of stimulating experiences, and it can be cogently argued that the average university professor stunts his development by living too cloistered and academic a life. More varied experiences would season him, give him added vitality, and lend greater breadth and penetration to his scholarship.

In this connection, we may ask whether or not extension teaching is valuable to the instructor. Do his experiences with students different from those he is accustomed to teach contribute to his growth? Is he obliged to improve his teaching methods, or do the circumstances in extension classes force him to teach on a lower plane? Extension experience may result in the development of

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careless, popularized, and superficial methods, or it may force the instructor to be more specific, to express himself with greater clarity, to use more illustrations, to be more informal, and to prepare his lessons more carefully.

The reactions of extension instructors in the various universities indicate a difference of opinion on this question. The chairman of the English department in one of the five foremost universities in this country stated that "extension experience is good for the instructor because he meets people of many patterns and thereby becomes exposed to a bigger world." He also pointed out that the extension instructor must be competent because "students will not pay good money for courses which are thin." The same professor indicated that some showmanship is necessary to interest extension students, but that dignity must always be maintained.

To the question "Is the experience acquired in teaching extension classes conducive to growth?" a teacher of elementary French replied, "—, no!" It is his opinion that teaching adults to read and speak French does not create any situations that improve his teaching; he says he merely works harder, while his students achieve less. In courses that are limited in scope by the students' desire to acquire very specific knowledge, the instructor may derive little or no benefit from extension instruction—unless he is studying the effect of his students' experiences and characteristics on learning habits and abilities.

In practical fields such as business, commerce, education, medicine, and engineering, and in some phases of

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psychology, sociology, and political science, it is almost imperative for an instructor to have intellectual intercourse with people outside the academic cloisters if he is to develop his scholarship fully. Theorizing in applied fields without associating with people who are doing practical work in those fields develops restricted and often impractical views. Extension teaching affords the academician an opportunity to deal with people who are interested in the course content because of its relation to their work. Such an association often results in reciprocal benefits to instructor and class members.

It seems appropriate at this point to mention the numerous appointments of faculty members to government positions during the crisis of the past several years. Experience in such work is of inestimable value to the professors, for without it they might have become shallow academicians and detached pedants. Any contact that professors may have with actual practice makes less applicable to them the words, "He who knows and knows but never does what he knows is like the man who sows and sows but never reaps what he sows."

Some professors consider the experience of teaching extramural classes both interesting and stimulating, because it tends to sharpen their wits and keep them alert. For this reason, many prefer their extension to their residence teaching. One professor who taught an extension course in social trends said that it liberalized his mind and revitalized his thinking. Extension students were much more interesting to an instructor of public

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speaking and drama because they had had wider experience than the campus students. After making a distinction between the adults who desire knowledge and understanding and those who are primarily interested in credits, a professor of physics stated, "I'd rather teach adults. I can lead them further. College youngsters know so much that isn't true."

On the other hand, an instructor of English said he liked the "college kids" and was more stimulated by them. "Youngsters," he said, "have meager backgrounds, but their responses have more life because they have fewer inhibitions. They haven't been regimented as have adults."

Some extension students are a joy to instructors because they are proficient in the subject studied. A history professor pointed out that many of the students in his extension class were high school history teachers who were reasonably competent in the field. There was much vitality in this class, and the professor found it necessary to prepare very carefully for his teaching.

An extension instructor who is a popular speaker at public forums believes that faculty members fall into a rut. Contact with the world is beneficial to such teachers. After stating that extension students are not stimulating, a teacher in psychology said that extension experience helps his campus teaching because it requires the use of concrete and interesting material. The fact that extension students desire detailed descriptions of experiments rather than glittering generalities necessitates the use of concrete and specific methods.

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A few of the instructors who do not believe that extension experience is particularly advantageous to them, state that it pays small dividends in terms of scholarship and the improvement of instructional methods, and that the time used to teach extension classes could be more profitably spent in research. In one or two universities several professors whose classes were composed mainly of schoolteachers with credit-hunting proclivities said that extension teaching was burdensome work without appreciable returns for either instructor or students.

The value of extramural experience to the professor varies, of course, with the circumstances. In some instances the instructor profits in several ways, as has been indicated, while in others he derives no benefit except the additional compensation.

### SUMMARY

The extension teacher has many pedagogical advantages. He has an opportunity to base his instruction on the needs and interests of his students, to depart from stereotyped academic practices and introduce teaching methods adapted to the problems and requirements of the extension students.

Teachers tend to be more generous in marking the work of extension students than they are that of residence students. In other words, it is easier to obtain good marks in extension than in residence classes. This is not particularly serious, for relatively few residence students take courses in extension and apply the credits there gained on a degree.

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There is a possible handicap in extension teaching in the fiscal policies under which extension divisions operate. As long as extension divisions are dependent to a great extent upon students' fees, certain disadvantages will be inherent in extension teaching. Various teaching facilities, selection of the staff, administrative policies, and even the marking standards reflect to a considerable degree the fiscal policies of the extension divisions.

Other factors that influence the attitudes and efficiency of extension teachers and students are the lack of library and laboratory facilities, the students' inadequate time for study, the long class periods, and the failure of many extension students to pursue courses in logical sequence. None of these handicaps is so serious that it cannot be overcome or so confining that it prevents the extension students from having profitable experiences.

The teachers of extension classes have been evaluated here in terms of their academic rank, degrees, and amount of publication. In some instances extension teachers appear to have been well selected and in other cases not. The problem is that of carefully choosing from the university faculties men and women of high scholarship, superior teaching ability, and rich experience to teach extension classes. Some university instructors believe that extension teaching broadens and enriches them, but others do not.



## THE RELATIONSHIP BETWEEN AGE AND MENTAL ABILITY

### FACTORS AFFECTING THE FINDINGS

THE relationship between mental ability and age is an interesting and important factor in adult education. Do abilities increase or decrease with age? Do they remain constant, or do some increase while others decline?

This relationship as analyzed for the childhood years in the numerous studies of children's abilities shows that from birth to adolescence there is a marked growth in most abilities, mental and physiological. Such studies are much more easily made for children than for adults. Since most children are in school, they have similar opportunities and, to a large extent, a comparable environment. Also, with the exception of those in the upper grades, school children represent the actual average abilities of their respective age groups.

But whether or not general mental ability and capacity decrease after maturity has been reached is a subject of controversy. Some data show that mental abilities decline with age; some that there is a fairly constant level; still others suggest an increase during adult years. One cause for the unreliability of these data is that all the

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adults in the age range may not be equally well selected. Since there is a very wide range of ability for every adult age, certain factors may cause a better selection of persons at one age level than at another. For example, more of the capable individuals may be included in the older groups and more of the less capable in the younger groups. The selection may be just the opposite, or it may vary unsystematically throughout the age range. Unless all the individuals in each age group are comparable, variation in selection will make it unlikely that the trend of ability for an age range represents the actual relationship between age and ability.

In order to determine this relationship accurately, various abilities must be compared within a group of individuals whose ages extend over a considerable range. The age trend for different mental abilities in the same individuals will indicate the differential effect of age on the various abilities. Such comparisons will not, however, show whether general capacity increases, decreases, or remains the same with age. They will merely indicate which abilities decline, which ones increase, and which ones remain approximately the same. But such a study of the differential effect of age on abilities leads to some very important implications concerning mental development during adulthood.

Before discussing further the relation between age and ability, we need to recall the distinction between ability and capacity. Ability is skill, knowledge, and performance; capacity is the power to develop ability. Decline

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of abilities does not necessarily indicate that capacity declines. It is possible for certain abilities measured by aptitude tests to decrease without a corresponding decline in actual capacity or mental power.

For example, adults may have little ability in arithmetic, in remembering directions, and in learning new subject matter, because their experience in such fields is limited and remote; but their capacity for those abilities may have declined much less than the actual abilities. If these adults lived in an environment that stimulated them or required them to maintain their abilities at a maximum, the trend in their abilities would indicate an actual trend in their capacities. Furthermore, as the results of some investigations suggest, decline would not begin during the twenties but in the forties and fifties and would be much less than is now observed. Ability decreases steadily in activities that are not practiced, but the capacity for those abilities does not necessarily decline along with them; yet if disuse of an ability continues too long, the capacity for it may also decrease.

### DETERMINING THE DIFFERENTIAL EFFECT OF AGE ON ABILITIES

Aptitude tests were administered to approximately 8,000 adults, ranging in age from the late teens to the seventies, who were extension students in a number of state universities. There were more subjects in the lower than in the upper age groups, since there are more young than old adults in extension classes. The tests used were

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the Psychological Examination of the American Council on Education, the Kentucky Classification Test, the Minnesota Reading Examination, the Minnesota Aptitude Test, and the Ohio State University Psychological Test. Total scores obtained on these tests showed a slight upward trend with age.

Fortunately, the tests administered consist of parts that differ in nature, and this variation makes it possible to note the effect of age on various abilities. The younger groups have higher scores on some sections of the test, while the older adults are superior in other sections.

### RESULTS ON THE AMERICAN COUNCIL TEST

Figures 15 and 16 depict the trend in abilities over an age range of about forty years. The abilities are those measured by the psychological examination prepared by Professor L. L. Thurstone and published by the American Council on Education. This test, which is frequently used with high school graduates and college freshmen, includes the following sections: completion, artificial language, analogies, arithmetic, and opposites. In the following discussion the results for each section will be analyzed separately. Since the nature of the tests should be understood in order to interpret the curves, a brief description of each test will be given.

*Analogies.*—This test differs from the typical analogies test, in which one word is to another as a third word is to one of several—for example, *blue* is to *sky* as *green* is to *army*, *grass*, *young*, *apple*. The analogies in the American

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Council Test do not contain words, but figures and forms like those in the accompanying samples. The other analogies are combinations of circles, arcs, squares, dots, triangles, lines, etc., in arrangements similar to those of the samples.

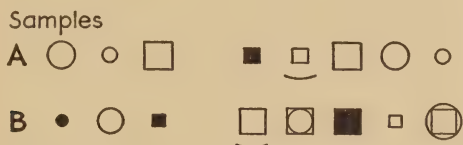


Figure 16 indicates that the ability to solve nonverbal analogies is at its maximum in the youngest group, fifteen to nineteen years old. This ability declines steadily and rapidly until the thirty- to thirty-four-year age group is reached. At this point a slight increase begins and continues up to the group from forty-five to forty-nine; there is then a rapid decline in the group fifty years old and over.

The line showing the trend of scores for any test section should be compared with the line representing the total score. This line, which represents a composite of all the test sections, shows the trend of general or composite ability over the age range. The lines or curves for some parts of the test follow much the same pattern as that for the total test, while others run contrary to it. An instance of the latter is the curve for the analogies test, which begins far above the line for the total scores, soon crosses it, and ends below it.

The consistency of the relationship between the curve

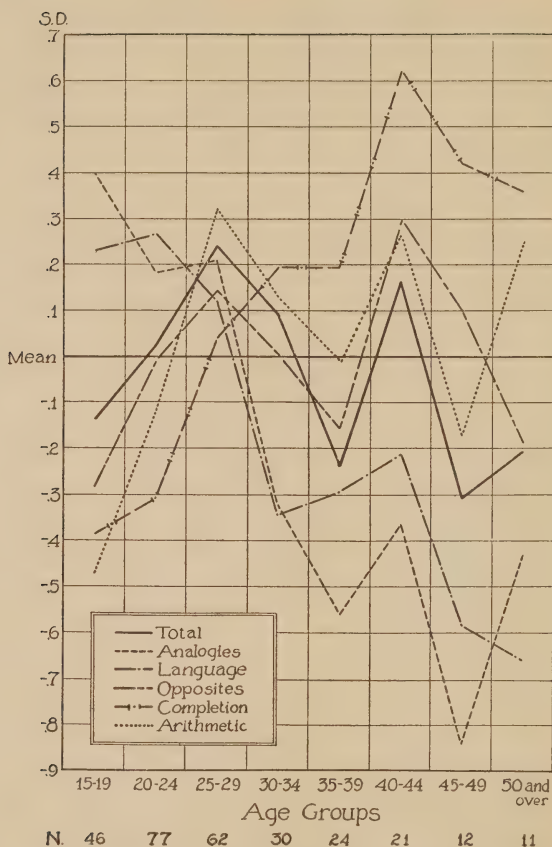


FIGURE 15.—AGE AND ABILITY ON SECTIONS OF THE PSYCHOLOGICAL EXAMINATION OF THE AMERICAN COUNCIL ON EDUCATION, IN UNIVERSITY D

The *S.D.* at the upper left hand corner of this figure and the others in this chapter is an abbreviation for a statistical measure known as the *standard deviation*. In order to secure a valid comparison of the average scores made by the different age groups,



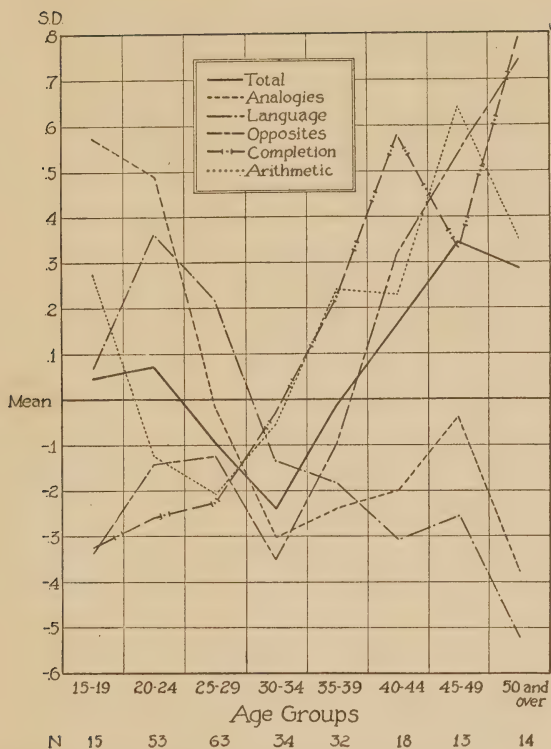


FIGURE 16.—AGE AND ABILITY ON SECTIONS OF THE PSYCHOLOGICAL EXAMINATION OF THE AMERICAN COUNCIL ON EDUCATION, IN UNIVERSITY A

they have been compared according to standard deviation units. It is impossible to compare directly the scores on various tests, because a score in one test which is lower numerically than a score in another test may actually be much higher in terms of performance or achievement. All the scores must therefore be translated into a comparable unit, which in this case is the standard deviation.

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for analogies and the curve for the total scores should be noted in Figures 15 and 16. The consistent relationship between the analogies curve and the curves for the other parts of the test is also significant. According to both figures, the youngest group is higher in the analogies test than in any other; but for all groups past thirty the average analogy scores are consistently the lowest or next to the lowest of all the scores.

*Artificial language.*—This test measures the accuracy and speed with which the subject can translate English words into artificial words and vice versa. A small vocabulary of pronouns, verbs, etc., with their artificial-word equivalents is included; for example, *ac* means I; *acos*, me; *ays*, he. Rules are presented for forming plurals, nouns, adjectives, adverbs, and verbs of various tenses from these artificial words. The score is determined by the number of words correctly translated from English into their artificial equivalents or vice versa.

It is apparent that this is a difficult test, since adult experience usually furnishes very little, if any, direct aid. The artificial words are, of course, entirely new; in fact, the whole test situation is comparatively new for all except the very young adults. The process of changing the forms of the words according to specified rules tests both reading ability and ability to follow directions. It is also an excellent measure of the ability to make substitutions. Rigorous concentration and strict attention to detail are necessary for success in such a test.

The curves for this test, like those for the analogies

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test, indicate that the abilities of the younger adults are greater than those of older ones. Figure 16 indicates that, except for the arithmetic performance of the fifteen- to nineteen-year age group, only the scores for the analogies and artificial-language tests are relatively higher than the total scores for the younger adults from fifteen to twenty-five years of age. For the older age groups these are the only two tests below the line representing the total score. This change of their position in relation to the other tests and to the total is very significant. There is a complete reversal of their position over an age range extending from fifteen through the fifties.

These facts reveal some very important characteristics of mental development. It is evident that the trends of various abilities may be in opposite directions, some decreasing with age, others increasing. Those abilities that are greatest among the young are least among the older subjects, and those in which the younger persons are poorest are those in which adults in their late forties and fifties score highest. This is true for both groups tested. The consistency in the patterns of the data shown in Figures 15 and 16 indicates that the results are reliable.

The adults whose abilities are represented by the curves in Figures 15 and 16 live in places separated by almost the total width of the United States. Their abilities were measured with the same tests. Analysis of the results shows the same relationships between their various abilities. The differential effect of increasing age is thus shown to be surprisingly constant.

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*Opposites.*—The “opposites” test is a word test in which the words are arranged in rows and columns.<sup>1</sup> There are thirty rows, each including four words. Each row contains two words that are “the same or nearly the same in meaning” or two words “the opposite or nearly the opposite in meaning.” The numbers of the words that mean the same are to be recorded in a column headed *Same*, and the numbers of the opposites in a column headed *Opposite*. An example follows:

1. far	2. soft	3. cold	4. chilly	<i>Same</i>	<i>Opposite</i>
				<u>3 &amp; 4</u>	<u>&amp;</u>

Since *cold* and *chilly* have similar meanings, their numbers are recorded in the *Same* column. The following row contains opposites:

1. queer	2. hard	3. soft	4. lost	<i>Same</i>	<i>Opposite</i>
				<u>&amp;</u>	<u>2 &amp; 3</u>

In the first three of the thirty rows, the correct answers are indicated, leaving twenty-seven rows for the subject to solve. The words included in most of the rows are more difficult than those cited, enough so to make an adequate test of the ability of most individuals. Although this test is not a definition test, it is an actual vocabulary or word-meaning test. The subject is asked to determine the meanings of words, but not exactly in the manner to which he is accustomed.

<sup>1</sup> Although this test includes synonyms as well as antonyms, it is called the “opposites” test and will be thus referred to throughout the discussion. The examples in this section are quoted from the 1933 edition of the American Council Test.

## AGE AND ABILITY

The ability of the younger groups in this test is relatively lower than their ability in the test as a whole. Ability in the opposites test remains below the total score until the thirties are reached, at which point it exceeds general ability as shown by the total score. The scores in the opposites test for every group in the forties and fifties are relatively higher than the total scores.

Apparently, the ability to pair words according to opposite or synonymous meanings increases with age. It should also be noted that the trend in the curve for the opposites test is in a direction contrary to those for the analogies and artificial-language tests.

*Completion.*—This test consists of a series of forty sentences, each of which is a definition of the word to be supplied. The number of letters in the missing word is indicated in each sentence. The object in the test is to supply in every sentence a word containing the specified number of letters and having the required meaning. The following sentence taken from the completion section of the American Council Test is an example of the series:

A (7)\_\_\_\_\_ is a collection of books for study or reading.

The correct word, *library*, should be written in the space provided for the answer.

This test is also a vocabulary or word-meaning test, though it differs from the typical vocabulary test, in which each word in a given list is followed by several others, one of which has the same meaning as the given word. The object in the ordinary vocabulary test is to recognize

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and underline the synonym of the word first given. The completion test, on the other hand, requires the subject to employ the process of recall in order to supply the correct word.

The curves for the completion test in Figures 15 and 16 follow the same general direction as the curves for the opposites test, though there is a tendency for the older groups to show relatively greater superiority in the completion test than in the opposites test. As measured by the completion test, the ability to supply words for a given meaning increases with age. The ability of the younger groups in the completion test is below their general or average ability in the entire test, but this relationship is reversed for the older groups. The curve for the completion test rises very rapidly and its upward trend is very pronounced; in both Figures 15 and 16 it is above the curve for total scores soon after the beginning of the thirty-year age group and remains so for all the groups above that age. In Figure 16 both the arithmetic and opposites curves follow closely the curve for the completion test.

*Arithmetic.*—The arithmetic test consists of twenty problems typical of the less modern arithmetic, involving such processes as proportion, fractions, and percentage. The following are examples:

A gentleman's estate is so divided that  $\frac{2}{3}$  of it is woodland and  $\frac{1}{4}$  of it is water. The remaining 300 acres are under cultivation. How many acres are there in the estate?

If 9 turns of a screw advance it  $2\frac{1}{4}$  inches, how far will  $12\frac{1}{4}$  turns advance it?



## AGE AND ABILITY

This test may be described as a means of measuring "good old-fashioned" arithmetic ability.

There is an inconsistency in the arithmetical ability of the youngest groups. This ability is relatively lower than any other in the youngest group represented in Figure 15, but it is next to the highest in the youngest group in Figure 16. In short, the positions of the two fifteen- to nineteen-year groups are almost exactly opposite. It is probable that a group of young adults who were especially proficient in arithmetic happened by chance to be enrolled in extension classes at one university when the tests were given. After a point in the twenties, the arithmetic curve in Figure 16 takes a position similar to that of the corresponding curve in Figure 15.

There is a tendency for arithmetical ability to increase with age, though the curve for the younger groups represented in Figure 16 seems to be an exception to this general conclusion. The trend in the arithmetic curves is essentially the same as the trend of the curves for the completion and opposites test.

*Summary.*—In the curves presented to represent the total scores, there are irregularities that make it rather difficult to follow the trends; but if a smooth line were drawn representing an approximation of the total scores of the various age groups, no marked trend either up or down would be apparent. The irregularities in the curve probably do not represent the true ability of all adults in the various age groups, but may be caused by the operation of selective factors that have favored some of the age

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groups more than others. The possible effects of such factors are an important unknown in the situation.

The trend of the curves for individual tests is clear and unmistakable. The analogies and the artificial-language curves disclose a trend opposite to that of the curves for the arithmetic, completion, and opposites tests.<sup>2</sup> The abilities measured by the analogies and the artificial-language tests are relatively highest in the group below thirty, but relatively lowest in the groups after the thirties. The reverse is found in the scores on the arithmetic, completion, and opposites tests. The groups under thirty are relatively lowest in the latter tests, but adults above thirty rank relatively higher. The highest ratings in these tests are obtained by individuals in their forties and fifties. This would indicate that the abilities measured by these tests increase with age.

### RESULTS FROM THE KENTUCKY CLASSIFICATION TEST

Figure 17 is based on the scores obtained on the Kentucky Classification Test devised by Professor Asher of the University of Kentucky. Various sections of the test measure the ability to make judgments and interpretations, to recognize the synonyms and antonyms of given words, and to work problems in arithmetic and simple algebra. The results of these tests for the adult students to whom they were given are essentially the same as those obtained in other institutions, and thus provide

<sup>2</sup> It has been previously noted that part of the arithmetic curve in Figure 16 is not consistent with the general trend. See page 149.

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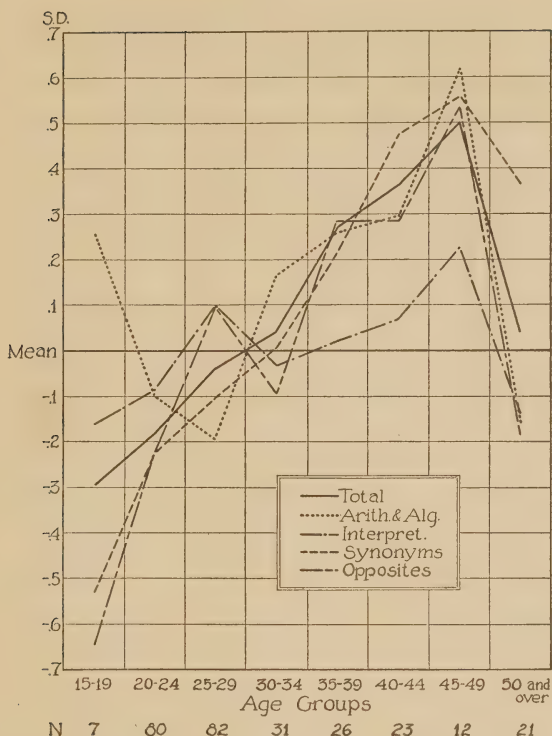


FIGURE 17.—AGE AND ABILITY ON SECTIONS OF THE KENTUCKY CLASSIFICATION TEST, IN UNIVERSITY C

further verification and validation of these measurements.

The trend as revealed by this test is from lower scores in the younger group to higher scores in the older group. In spite of this general trend, however, the oldest group is lower in all abilities than the age group that precedes

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it. The least decline in the oldest group appears in the synonyms test, while the decline in the opposites test is very sharp. This group apparently found it easier to name the synonyms than the antonyms of words.

The test measuring the ability to interpret the meaning of maxims or adages should receive special emphasis, since it is a judgment and "wisdom" test. It consists of statements such as: "Only the brave deserve the fair"; "Don't put all your eggs in one basket"; "Make hay while the sun shines." Each maxim is followed by four statements, one of which represents the correct interpretation. Accurate selection depends upon the subject's judgment, critical ability, and, to a certain extent, so-called wisdom. The individuals with the most extensive experience should possess, in the highest degree, the wisdom necessary to select the most adequate interpretations of the proverbs.

It might be assumed that younger adults have not had sufficient experience to acquire such wisdom. The facts, however, do not confirm this assumption. Although there is a slight increase with age in this particular ability, it is less than the increase for the other three abilities. The exact trend of the various abilities shown by the curves in Figure 17 is worth special study on this point. The findings do not confirm the general assumption that age brings superior judgment and greater wisdom. Perhaps the old in self-defense have claimed for themselves a larger measure of these qualities than they actually possess.

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Of course, a test requiring the interpretation of aphorisms probably measures judgment rather than wisdom. Yet a test of the power to evaluate statements having universal significance must be, to some extent at least, a test of wisdom—more so, for example, than vocabulary and arithmetic tests. In any case, the evidence justifies raising a question in regard to the growth of judgment and wisdom with age. It suggests the possibility that, as age advances, the powers of judgment and evaluation decline rather than increase. Further inquiry may reveal evidence indicating that the prevalent belief concerning the wisdom of the old is as inaccurate as many other unsubstantiated opinions.

### DIFFERENTIAL TRENDS SHOWN BY THE MINNESOTA READING EXAMINATION

Figure 18 depicts the results obtained in the two parts of the Minnesota Reading Examination. As indicated by the curves, the relationship of age to paragraph-reading ability differs noticeably from that of age to size of vocabulary. The fifteen- to nineteen-year group is the lowest in vocabulary ability and is below the mean ability of all groups; the adults over fifty-five years of age, on the other hand, have the largest vocabularies and are as far above the general average as the younger students are below it.

At no point does the curve representing paragraph-reading ability deviate as much from the mean as the curve for vocabulary ability. It is significant that the re-

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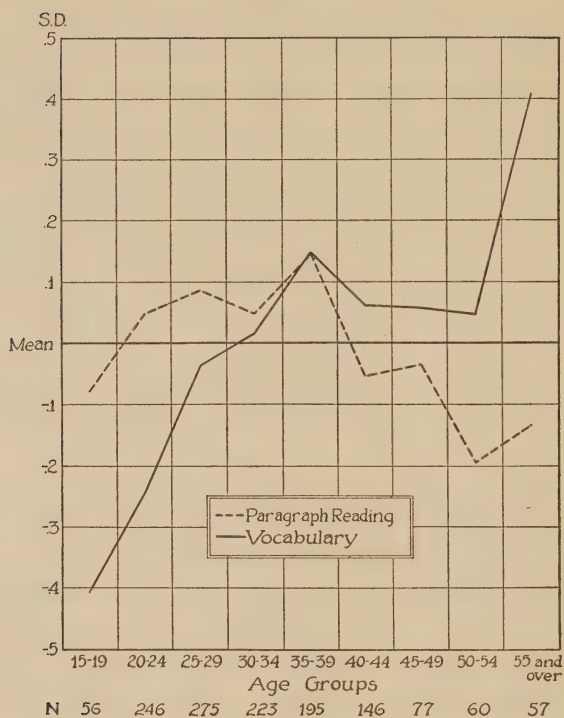


FIGURE 18.—AGE AND ABILITY ON SECTIONS OF THE MINNESOTA  
READING EXAMINATION, IN UNIVERSITY E

lationship of the curves before and after they cross, even though a reverse relationship, is unusually constant.

The relationship of the two curves cannot be explained by the supposition that the older subjects are penalized by speed tests and obtain better scores in power tests. This explanation is invalid because, as a matter of fact, the paragraph-reading test is a power test, and the vo-



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cabulary test is to some extent a speed test. The curves indicate the differential effect of adult habits, abilities, and characteristics on paragraph-reading and vocabulary abilities as measured by this test.

### DIFFERENTIAL TRENDS SHOWN BY THE OHIO STATE UNIVERSITY PSYCHOLOGICAL TEST

Figure 19 presents the results obtained on the Ohio State University Psychological Test, Form 17, and the subtests included in it. The curves for the various subtests follow approximately the same pattern throughout the entire age range. The subtests, which are entirely verbal, include analogies, paragraph-reading, and a vocabulary test in which the synonyms and opposites of given words must be indicated. The paragraph-reading test consists of a series of paragraphs, each followed by multiple-choice questions, the answers to which indicate the student's understanding of the paragraph. The following are examples of the other two subtests:

#### *Vocabulary*

Ache is the same as 1. earache 2. wound 3. pain 4. blister  
5. send.

Hate is the opposite of 1. see 2. deaf 3. regard 4. amuse  
5. love.

#### *Analogies*

push pushed run: 1. running 2. runs 3. runner 4. ran  
5. runned.

friend friend's John: 1. Johns' 2. Johnes 3. John's  
4. Jones 5. Jons.

As is usually the case, vocabulary ability was found

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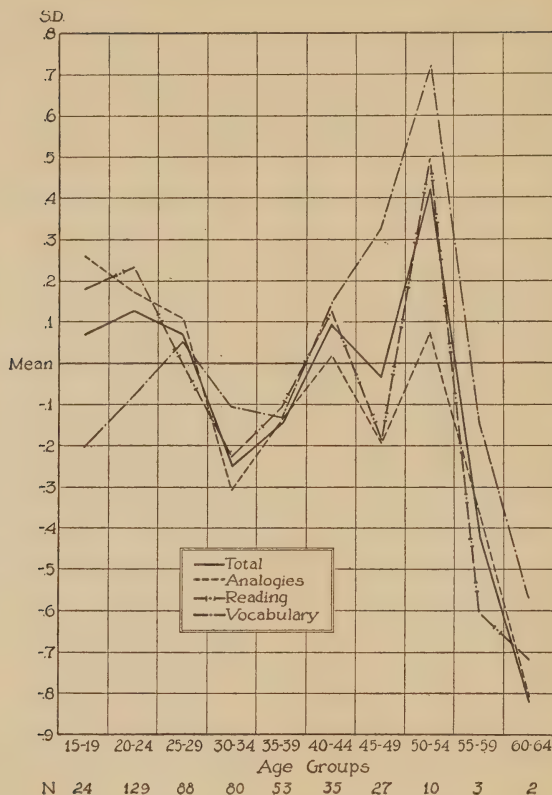


FIGURE 19.—AGE AND ABILITY ON SECTIONS OF THE OHIO STATE UNIVERSITY PSYCHOLOGICAL TEST, IN UNIVERSITY B

by this test to be lowest among the younger adults and highest among the older ones. The curve for reading ability, which follows closely the curve for the composite test, reaches a high point in the fifty- to fifty-four-year age group. In this respect the trend with age for the para-

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graph-reading section of the Ohio State University Psychological Test differs from the trend for the paragraph-reading section of the Minnesota Reading Examination.

It is to be noted that the paragraph-reading curve in Figure 18 does not tend to follow the curve for vocabulary scores, as it does in Figure 19. These results indicate that differences in such factors as the structure of similar tests, the characteristics of various adult groups, and the relative emphasis on speed and power may alter results and lead to contradictory conclusions.

The curve for the analogies test in Figure 19 does not rise as high as do the other curves. It begins higher than any other curve, drops lowest at the thirty- to thirty-four-year level, fails to reach a high point for the fifty- to fifty-four-year age group, and finally drops lower than the curves for the vocabulary and reading tests. Its course is in some respects similar to that of the curves for nonverbal analogies in Figures 15 and 16. Although the decline for the nonverbal analogies is sharper, the curves in Figure 15, 16, and 19 are otherwise alike in showing that not only is the decline arrested during the thirties and forties but that there is even a slight increase. These curves indicate, as do others, that when the test material is verbal, there is either less decline or a greater increase in ability with age than when the material is nonverbal.

### RESULTS OF OTHER INVESTIGATIONS

These findings concerning the differential trend with age according to the nature of the abilities tested are not

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unique. They are more pronounced than the findings of others, but other investigators too have discovered that some abilities increase while others decline, that some decline more than others, or that some abilities remain essentially constant throughout a wide age range while other abilities either increase or decrease.

*Ruch.*—An experiment to determine the relation between age and the ability or disability to learn various combinations of words and symbols was conducted by Ruch.<sup>3</sup> He measured the learning capacity of one hundred and twenty individuals whose ages ranged from twelve to eighty-three years. These subjects were classified into a young group aged twelve to eighteen years, a middle-aged group thirty-four to fifty-nine years, and an old group sixty to eighty-three years.<sup>4</sup>

One test given these subjects measured the ability to learn pairs of words often associated, for example, *horse—sheep*. Another test consisted of simple equations, such as  $F \propto P = B$ , and another of false multiplication items, such as  $2 \times 4 = 9$ . Each of these three tests consisted of ten pairs, in addition to one practice pair. The same procedure was followed for all three tests. The left half of an item (*horse*, or  $F \propto P$ , or  $2 \times 4$  in the above examples) was exposed for five seconds; then the right half (*sheep*, or  $B$ , or  $9$ ) was shown for one second. Each pair was exposed in this manner fifteen times. The object was

<sup>3</sup> Floyd L. Ruch, *The Differentiative Effects of Age on Human Learning* (Doctor's thesis, Stanford University, 1930).

<sup>4</sup> Floyd L. Ruch, "The Differentiative Effects of Age on Human Learning," *Journal of General Psychology*, 11:261-86 (1934).

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to learn the pairs so that the unexposed halves could be named before they were shown. A subject's score was determined by the number of correct answers he supplied during the fifteen exposures of each series of ten items.

In each test the abilities of the older subjects proved to be lower than those of the younger ones. This fact in itself is not especially significant, since the youngest group might have been composed of superior, and the oldest group of average, individuals—though such was probably not the case. The important fact, however, is not that the abilities measured by these tests appear to decline with age, but that some abilities decline considerably more than others. The ability to learn pairs of logically associated words declines much less than the ability to learn new combinations of letters in simple equations or false multiplication items. The ability to learn false multiplication items shows the greatest decrement with age.

Perhaps older people should be commended for their relative inability to learn things that are not true. The danger is that this inability may be a characteristic lack of flexibility that will also operate in learning and understanding what is true but seems untrue. The pattern of learning shows that adults maintain best those abilities which are consonant with old patterns and experiences. New materials are assimilated less readily as one grows older, and learning that requires the breaking of old patterns before new ones can be substituted shows the sharpest decline with age.

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*Price.*—The abilities of a group of adults to reproduce spoken directions were tested by Price.<sup>5</sup> His 655 adult subjects ranged in age from twenty-five to ninety years. The test consisted of spoken directions involving various imaginary situations. For example, the subject was asked to suppose that he was buying an overcoat and giving certain directions to the clerk. These directions, enumerated by the examiner, included instructions for delivery on approval to a specific place at a specific time, information as to what should be done if no one was at home, and a statement of what the prospective buyer would do if he decided to buy the coat.

Other imaginary situations involved directions for leaving town, for overcoming fear of water, and for opening a cottage that had been rented. Directions were also given as though to officers going to a serious accident, and to parents taking care of a child with pneumonia. After the directions had been given, the subject repeated as many of them as he could remember and his responses were recorded. Keys were formulated containing the essential elements of each set of directions, so that each response could be scored objectively.

Results of the experiment reveal that the ability to repeat oral directions declines with age. The greatest decline occurs between the two oldest groups, the next greatest between the group averaging thirty years of age and the one averaging forty. Statistically speaking, the

<sup>5</sup> Bronson A. Price, *Directions Test Arranged as an Interview and a Determination of Adult Age Effects Therewith* (Doctor's thesis, Stanford University, 1933).



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average decline from decade to decade is .40 of the standard deviation of the ability for the entire sampling. In other words, about 78 per cent of the adults of a given age are more capable than the average of those twenty years older, or 22 per cent are more capable than the average of those twenty years younger.

Price's important discovery that the amount of variation in ability increases with age, even though the average scores decline, is significantly connected with the topic of differential decline. Thus, the coefficient of variation for the thirty-year group is 18.9, while for the seventy-year group it is 38.9, over twice as great. This increase in variability is very significant and implies that there are great individual differences in the rate of decline.

*Willoughby.*—Willoughby compared the abilities of a selected group of children with those of their parents, brothers, and sisters.<sup>6</sup> It may be assumed that children are, on the average, potentially equal to their parents, since they are so closely related. Because the stock is the same, differences in measured abilities must be attributed to such factors as age, education, recency of practice, extensiveness of training, and various environmental factors which influence the development of the abilities in question.

The one-hour test used by Willoughby comprised elements from four well-known intelligence tests. It included antonyms and synonyms involving digits and words,

<sup>6</sup> Raymond R. Willoughby, *Family Similarities in Mental-Test Abilities*, Genetic Psychology Monographs, Vol. II, No. 4 (Clark University Press, 1927), pp. 237-277.

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tests in scientific, historical, and literary information, the completion of number and symbol series, arithmetical reasoning, vocabulary, verbally presented analogies, the recognition of relationships between simple geometrical forms, and a digit-symbol substitution test. This test was administered to a selected group of 141 thirteen-year-old children, who were considered the basic group, and to 100 of their mothers, 90 of their fathers, and 280 of their brothers and sisters.

The results of this study are similar to those of several other investigations. It was found that abilities increase rapidly up to the middle teens and then develop much more slowly. The various abilities rise to their highest point in the late teens or early twenties and remain on a plateau until the age of thirty has been reached; then a gradual decline begins and continues steadily. The results of Willoughby's study are contrary to the findings of some investigators in that they do not reveal a considerably more rapid decline of abilities in the later ages. He found that in most of the tests the level of ability at the age of sixty is equivalent to the levels of twelve- and thirteen-year-old children. In two tests involving digits and symbols the mean abilities of the sixty-year-old group were found to be equal to those of ten-year-old children; this was the lowest level reached by the sixty-year-old group in any test.

The ability measured by the arithmetical-reasoning test differs from the others in showing only a very slight decrement between the ages of thirty and fifty. After

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fifty the decline is more rapid. The level of the sixty-year-old group in this test is equivalent to that of the fourteen-year-olds.

According to Willoughby's experiment, all the abilities tested decline with age, though there is a greater decrement in some abilities than in others. The abilities measured by the typical verbal tests decline less than the abilities involved in digit and symbol tests. Contrary to the findings in most investigations, Willoughby's results indicate that the vocabularies of the older subjects are smaller than those of the younger ones.

It is particularly significant that the abilities measured by tests of information in science, history, and literature decline in the same manner as the abilities measured by typical intelligence tests. This may result from the fact that the tests measured school information rather than general information. Knowledge in the fields of science, history, and literature is likely to be a reflection of training, whereas the abilities involved in intelligence tests are assumed to measure native brightness. Consequently, intelligent adults were often at a disadvantage in tests in which children trained in the subject matter had an advantage.

Willoughby's evidence indicates that the abilities measured by achievement and those measured by intelligence tests are related in the same way to the amount of training; that is, the two kinds of abilities reflect environmental factors similarly. Tests consisting of symbols and digits arranged to create the situations with which adults

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are least familiar are the tests in which adults show the most decrement—suggesting that the abilities adults are least familiar with decrease most with age.

*Jones and Conrad.*—These two investigators administered the Army Alpha Test to a number of New Englanders whose ages covered a wide range.<sup>7</sup> According to their findings the peak is attained at about the eighteen-year level. Ability in this test decreases steadily from twenty on to sixty years.

The decline in the Army Alpha Test would be greater were it not for the scores on two of its sections or subtests, the vocabulary and the general-information sections, which did not decline. Knowledge of words and general information maintain themselves throughout the age range covered by this study. This fact adds to our knowledge concerning the differential nature of decline with age and is consistent with the results of other investigations.

*Weisenburg, Roe, and McBride.*—These investigators conducted a particularly interesting experiment, in which a relatively large number of verbal and nonverbal tests were administered to a group of approximately sixty to

<sup>7</sup> "Psychological Studies of Motion Pictures," *University of California Publications in Psychology*, 3:225-84 (1928-29). This includes: Part II, "Observation and Recall as a Function of Age," by Harold E. Jones assisted by Herbert S. Conrad and Aaron Horn; Part III, "Fidelity of Report as a Measure of Adult Intelligence," by Herbert S. Conrad and Harold E. Jones; and Part IV, "The Technique of Mental-Test Surveys among Adults," by Harold E. Jones and Herbert S. Conrad. See also Harold E. Jones and Herbert S. Conrad, *The Growth and Decline of Intelligence: A Study of a Homogeneous Group between the Ages of Ten and Sixty*, Genetic Psychology Monographs, Vol. XIII, No. 3 (Clark University Press, 1933), pp. 223-98.

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seventy individuals.<sup>8</sup> The term approximately is used, since not all the subjects took all the tests. The individuals tested were hospital patients whose health did not affect their mental capacities. Their maladies included diseases of the skin, the muscular-skeletal system, and the digestive system, as well as some miscellaneous illnesses. These adults ranged in age from the teens up to sixty, with a mean age of thirty-six.

The tests included general verbal intelligence tests, subject-matter or achievement tests, and general non-verbal intelligence tests. Since several measures of these three types were used, more capacities were tested than would have been the case if only one or two tests had been employed.

The relationship of age to the abilities tested in this study may be summarized as follows: All the correlations are low or moderate. The relationships between age and the verbal intelligence tests are not consistently positive or negative. The correlations between age and the oral and printed analogies tests are negative, while those between age and vocabulary tests are positive. There is no correlation between age and scores on the reading, spelling, and arithmetic tests. There is a negative relationship between age and scores on the nonverbal or performance tests. The highest correlations are those between age and the individual nonverbal test, and these are negative, ranging from  $-.25$  to  $-.53$ . The highest co-

<sup>8</sup> Theodore Weisenburg, Anne Roe, and Katherine E. McBride, *Adult Intelligence: A Psychological Study of Test Performances* (Oxford University Press, 1936).

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efficient for the verbal tests is  $-.37$  and the next highest is  $+.33$ .

These findings are consistent with the results reported in other investigations; this is particularly true of the tendency for older adults to have larger vocabularies. The fact that older adults tend to show less ability for comprehending verbal analogies is not unnatural, since they are not accustomed to think in such terms. It is significant that ability in arithmetic, reading, and spelling is essentially the same for all age groups.

The results of the nonverbal or nonlanguage test indicate that the ability measured by these tests declines with age. The differences between scores for the twenty-year group and those for the fifty-year group are statistically significant in only three of the seventeen tests—word knowledge, printed analogies, and the Seguin Formboard. In the word-knowledge test, the fifty-year group achieved scores significantly higher than those of the twenty-year group. However, the average scores of the older group on the analogies and formboard tests are significantly lower than those of the younger group.

On the basis of these results by Weisenburg, Roe, and McBride, it might be said that on the average there is no decline or increase in mental ability up to the age of sixty. It is better, however, to avoid making such a generalization and to recognize the rather definite pattern formed by the results of the various tests. The logical interpretation of these results is that certain types of abilities increase with age, while others decline. In other



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words, age has a differential effect on abilities. Abilities measured by the analogies and nonverbal tests decline with age; abilities measured by spelling, reading, and arithmetic tests are essentially the same throughout the age range; and word knowledge increases with age.

*Christian.*—Working under the direction of Professor Paterson, Christian got particularly significant results in an analysis of the relationship of age to speed and to power, because she used parents, friends, or relatives of college students as subjects.<sup>9</sup> It is generally assumed that college students represent family variation toward higher levels and that therefore they have more general capacity than their parents. However, in Christian's study not only the parents but also the relatives and friends were tested, which decreases the influence of these doubtful factors.

Christian used two verbal tests: the Moore Completion Test, a ten-minute vocabulary test consisting of forty items, and a fifteen-minute recognition vocabulary test containing one hundred and twenty items.

In the vocabulary test of the recall type (the Moore test), the scores of the older subjects are only slightly higher than those of the college students. The differences are just large enough to have statistical significance, but they do not indicate any important trend in the abilities of subjects aged forty, fifty, and sixty.

In the recognition vocabulary test, on the other hand,

<sup>9</sup> Alice M. Christian, *The Effect of Age in Later Maturity on Verbal and Motor Abilities* (Master's thesis, University of Minnesota, 1932).

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the abilities of the older subjects are lower than those of the younger students. There is also a slight downward trend with age among the older subjects. True, when only the scores on the first half of the test are compared, the superiority of the adults is statistically significant and shows a slight but unimportant increase with age; but the college students completed more items than did the adults. Thus, when the time limit is enforced the college students are superior, but when it is not the older subjects have the higher scores. The difference between the scores of the older and younger groups is greater in the latter case. The percentage of completed responses correct is higher among the older subjects.

It may be concluded then that when tests emphasize power rather than speed, older subjects are distinctly superior to college students; but when a time limit produces emphasis upon speed, the older adults are handicapped and appear inferior to the students. Apparently, the ability to answer rapidly on a vocabulary test is not high among individuals in their forties, fifties, and sixties, but the ability to answer correctly is.<sup>10</sup> This ability we term *power*, as compared with *speed*.

*Hollingworth.*—This investigator tested several abilities among five hundred and thirty-four adults whose ages ranged from twenty to forty-five years.<sup>11</sup> Tests for completion, opposites, word building, digit span, and sub-

<sup>10</sup> In this connection see also Catherine Cox Miles, "Influence of Speed and Age on Intelligence Scores of Adults," *Journal of General Psychology*, 10:208-10 (1934).

<sup>11</sup> H. L. Hollingworth, *Mental Growth and Decline: A Survey of Developmental Psychology* (New York, 1927), pp. 310-14.

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stitution were used. The results of this experiment indicate that verbal abilities as measured by the first four tests either remain constant or increase with age. On the other hand, the ability measured by the substitution test, which required the formation of new associations, shows a downward trend with age. While other abilities remain the same or increase with age, the ability necessitating a relatively unfamiliar mode of response declines with age. Hollingworth interprets his results as follows: "In general, the fact seems to be that with increasing age after maturity, learning capacity declines while general alertness and ability to utilize facts already acquired are still at their maximum."

*Sorenson.*—The writer studied the aptitudes as well as other characteristics of the extension students at the University of Minnesota.<sup>12</sup> Two tests, the Minnesota College Aptitude Test and the Minnesota Reading Examination, were administered to approximately 5,500 adults ranging in age from the teens to seventy years, the number of adults over sixty-five years being negligible, however. The data from this general study were analyzed by selecting age groups consisting of students who had, on the average, the same vocational status and similar amounts of schooling.<sup>13</sup> By this method two selective factors that influence mental ability were controlled. There were six hundred and forty-one cases included in this analysis.

<sup>12</sup> Sorenson, *Adult Abilities in Extension Classes*, pp. 56-62.

<sup>13</sup> Sorenson, "Mental Ability over a Wide Range of Adult Ages," *Journal of Applied Psychology*, 17:729-41 (December, 1933).

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The two tests measured vocabulary and the ability to interpret the meaning of printed paragraphs. The results indicate that vocabulary ability correlates positively with age. An analysis of the vocabulary scores, which were classified according to five-year age groups, discloses an almost constant increase from each age group to the next higher one. The average vocabulary score of the adults in the fifty- to sixty-four-year group is higher than the average score of those in the teens and twenties, the difference between them being approximately equal to one standard deviation of the distribution of scores for all the extension students or to a distance that includes approximately one-third of them. Thus, vocabulary scores show that the fifty- to sixty-four-year group is distinctly superior to the fifteen- to twenty-nine-year group.

The results from the six-minute vocabulary test, a section of the Minnesota Reading Examination, furnish an interesting contrast with the results of the one-hour vocabulary test, the Minnesota College Aptitude Test. In the short test, the number of items tried increased with age, but not so rapidly as the scores. In the one-hour vocabulary test, on the other hand, the number of items tried decreased, while the scores increased, with age. The older subjects were more accurate and thus obtained higher scores, although they did not attempt as many items as the younger groups. The older group, knowing more words, attempted a greater number of items during the short test, which emphasized speed more than the longer one. But the power of the older adults did not

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manifest itself in an increased number of attempts in the longer test.

These results suggest that the older subjects do not maintain the power to attempt test items for as long a period as do the younger subjects. This condition may be caused by fatigue on the part of older adults, or by their relative lack of discipline for test situations.

In the paragraph-reading test sufficient time was allowed to enable practically all the subjects to read each paragraph carefully and attempt to answer the questions concerning them. This test, then, was a measure of power rather than of speed. The scores on the test remain essentially constant throughout the age range. Whatever trend may be present is upward, but it is so small that it is barely perceptible. It may be noted, however, that the average score of the fifty- to sixty-four-year group is the highest of all groups. The number of items tried is highest among the younger students and declines with successively older age groups. The older subjects might have had higher scores if they had tried all the items, but they either did not possess the power of concentration, or they would not exert the effort, necessary to complete the forty-minute reading test. Or the older adults may not have had the intellectual interest or motivation of the younger subjects. Perhaps adults become more indolent intellectually with increasing age.

The findings of this study indicate that older adults are not necessarily handicapped when speed is an important factor. In this experiment they were superior in a

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short speed test because they had more power, but they did not manifest this power over longer periods.

These studies of adult mental abilities, briefly reviewed here to supplement the writer's findings, are not all that have been made, but they are the principal ones showing the trend of abilities with age, and also, in some instances, indicating various factors that influence the differential trend.

### POSSIBLE EXPLANATIONS FOR DIFFERENTIAL TREND WITH AGE

*Changes in the nervous system.*—The evidence presented raises several questions. How can the similar trend with age in certain abilities be explained? Why is the trend in some abilities directly opposite to that in others?

The neurological theory is one of several explanations that have been advanced to account for the discovered decline of ability with age. According to this theory, a decline in some abilities may be due to the deterioration of part of the nervous system with age, while an increase in other abilities may be the result of an improvement with age in other parts of the nervous system. It is very doubtful, however, that a differential trend in abilities over a range of adult years can be explained on this basis.

It is very unlikely that some functional parts of the nervous system decline with adult years while others grow and develop. This is especially true when the mental functions are closely related, as is the case with those measured by the American Council Test. If we accepted the neurological theory, we would have to assume that



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the parts of the nervous system which function in the analogies and artificial-language tests are different from those used in solving the arithmetic, completion, and opposites tests.

A second explanation, the psychological theory of localization, postulates that one part of the brain functions for certain mental processes and another part for others. A definite correlative relationship between structural and functional elements must therefore be assumed. According to this supposition nature has set aside one section of the brain, a few million cells let us say, for this mental function, several million for that one, and a few million more for another—a procedure resembling the allotment of federal aid for various projects. The analogy remains consistent, for there are approximately twelve or thirteen billion cells in the brain budget. It is thus possible to have cortical correlates for many different mental abilities.

It is probably true that there are different brain centers for certain sensory processes and for the autonomic functions of the body. In these cases there are various cortical areas corresponding to various physiological processes. Possibly the relationship between the brain and some of these functions is rigidly fixed, but the connection between parts of the brain and the intellectual processes is not so firmly established. None of the data on the interrelation of abilities and the brain and its processes support the theory of localized brain areas. It is highly improbable that one specific portion of the cerebral cortex is set aside for the arithmetical processes, another part for

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translations, and still others for analogies, reading, and vocabulary.

The best evidence indicates that there is no specific part of the brain to function for each process, but rather that the brain tends to function as a whole. The process that occurs in arithmetical reasoning also occurs in the other operations involved in a general aptitude test. The brain works as a functional unit when dealing with any of the intellectual problems described here. Essentially the same cells or cortical areas are probably involved in fitting a word to a given meaning and in translating artificial words into English.

The work of Lashley and Spearman implies that there can scarcely be a deterioration in the brain for one ability without a corresponding decline for a similar ability. The hypothesis of localization cannot possibly explain the fact that an ability like paragraph-reading declines or fails to increase, while vocabulary ability shows a definite increase with age. These abilities are so closely related that if one of them declined because of the deterioration of its neural basis or cortical correlate the other ability would also decline, and if one increased with age because of brain growth or development the other would increase too.

In order to avoid confusion, it should be recognized here that individuals differ in the extent of their various abilities. It is also an established fact that the mental abilities of each person vary, that nature endows individuals with greater capacities in one direction than in

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another and that no one is uniformly or equally adept in all mental functions. An individual may be superior in the more mechanical or computational phases of arithmetic and inferior in the problems requiring logical solutions, or vice versa. Some persons are more able in linguistic problems than in handling situations involving space and form. There are many different mental abilities, exhibiting numerous and varying relationships among themselves, and neither the degree nor the cause of these relationships has yet been ascertained.

But the variation among the abilities of individuals does not account for the differential trend with age. That trend must be explained by processes exterior and interior to the human organs.

*Use and disuse.*—Another explanation for the differential trend of abilities with age may be found in the psychological principle of use and disuse.<sup>14</sup> According to this theory, certain abilities increase with age if they are employed in the course of adult experience and decline if they are seldom or never exercised.

It is known that adults can acquire abilities through practice. Use and repetition develop the abilities to spell, translate, learn the meanings of words, and solve arithmetical problems. The fact that the adult may not in his everyday life have come in contact with the materials and problems included in some of the tests accounts, in part at least, for the differential development of adult

<sup>14</sup> Use and disuse may also be referred to as practice and nonpractice or exercise and nonexercise.

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abilities that we have noted. Furthermore, adult mental habits may develop into attitudes that cause a deterioration in some abilities and therefore handicap the individual in certain test situations. In short, the growth and decline of adult abilities may be explained by the theory of use and disuse.

*Relationship between neurological and psychological factors.*—The principal reasons, then, for any decline or growth in adult mental abilities may be found either in the physiological factors of deterioration and development of the nervous system, or in the psychological factors of use and disuse. Other explanations such as loss or gain of interest, decline or increase of opportunity, and decrease or increase in energy are related both to neurological change and to factors of use and disuse. An individual may lose interest in some types of mental work because he never practices them, or his intellectual energy may decline because of organic changes.

It should be recognized that the two theories, the neurological and the psychological, are not necessarily mutually exclusive; in fact, they may be related to a considerable extent. It is possible that mental activity or a lack of it—that is, use or disuse—influences the growth and decline of the nervous system. In other words, a nervous system may develop and mature more effectively if it experiences satisfactory and exhilarative activation. It is equally possible that if the nervous system normally involved in intellectual activity is allowed to become dormant through disuse, it develops less completely or

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declines more rapidly than if it were sustained by cerebration.

If this is the case, any increase or decrease in ability after mental maturity must be attributed to the influence of practice and experience or of their absence. There is probably no development or growth of the nervous system during adulthood; therefore, the best that can be expected is that the nervous system may remain unimpaired for a decade or two after maturity is reached.

It must be emphasized that intellectual growth is not commensurate with neurological development. In other words, abilities are not necessarily equal to capacities when maturity is reached. Vocabulary, arithmetical abilities, and the powers of interpretation may not have reached their maximum when neurological development ceases. These abilities may continue to develop to the limits set by neurological development. Thus an appreciable increase in the ability to use words and symbols is possible after an individual has passed his teens. Such an increase or development after maturity depends upon education and training in the abilities concerned. Decline is brought about, to a great extent, by lack of training and exercise.

*Differential trends with age explained in terms of practice and experience.*—Some of the curves for different abilities can be explained in terms of the theory of use and disuse. As we have seen, the scores on all the tests involving vocabulary ability tend to increase with age for every group tested. There appears to be a tendency

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for adults to learn the meaning of more words as they grow older. And in this case memory has more gains than losses, for adults apparently remember more words than they forget. On the other hand, the ability required to extract the meaning from printed paragraphs does not increase with age. One group even showed a decrease in reading ability, although the vocabulary scores of this same group increased with age.<sup>15</sup>

The explanation for this difference may lie in the habits and experiences of the subjects. Most of the individuals whose abilities are represented by the vocabulary curve in Figure 18 are teachers and other professional workers, stenographers, and business and clerical workers. Their everyday experiences include conversation, lectures, the use of the printed page and the dictionary, and various other situations that increase and maintain a knowledge of words. The meanings of words previously known are fixed in their minds by recurring contact, and new ones are learned incidentally. Vocabularies are adequately maintained by the normal amount of reading done by the average individual.

Some abilities, however, are maintained only by vigilant and sustained effort, and the manner in which many adults read tends to cause a lapse of the ability to ferret out the meanings of difficult paragraphs. They hastily scan the page for its general tenor, satisfying themselves with the general trend of an article or the main thread of a story. It is not necessary to probe for the meaning in

<sup>15</sup> See page 153, and Figure 18 on page 154.



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much of the material they read, since it is easily comprehended and does not require rigid concentration.

The reading matter of college students, on the other hand, consists to a great extent of textbooks that must be read intensively. Because textbooks generally are not written in a very lucid style, they call for greater effort on the part of the reader. Since the student must prepare for questions on the text, he reads and rereads, ferreting out the meaning of obscure passages. This is good training for paragraph-meaning tests, whereas the comparatively slipshod reading habits of adults are not conducive to good results in such tests.

In Figure 16 the trend of the curve for arithmetical ability is approximately the same as that for the ability with word meanings as shown by the curves for completion and opposites. The teacher and the bank clerk, for example, are experienced with arithmetic problems. The former teaches arithmetic while the latter has practical experience with arithmetical problems and processes. Consequently, groups beyond the thirty- to thirty-five-year age group have higher scores in arithmetic than in the composite ability measured by the entire test.

The abilities measured by the analogies and artificial-language tests are highest among individuals in their teens and lowest among those in their forties and fifties. Do the cumulative effects of a continual lack of exercise cause the decline with age in these abilities? An answer to the question may be found by referring to the nature of the tests. The analogies test is nonverbal; it consists

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of various geometrical forms such as circles, squares, triangles, lines, and segments. Adults are usually accustomed to think in verbal terms, seldom in terms of geometrical forms. Thus, while the ability to think verbally increases, nonverbal thinking ability decreases with age. Development continues up to the age of mental maturity; then it declines, because there is little activity to maintain it.

The same statements can be applied to the artificial-language test. Adult experience seldom necessitates the translation of artificial words into English or vice versa. This test, like the nonverbal analogies test, requires new adjustments. High school and college students, however, must translate and interpret foreign languages, mathematical symbols, and lecture notes; so they are relatively well prepared for an artificial-language test. Young students, too, have a more favorable attitude than adults toward such a test. In fact, the test in which failure to try was most apparent among adults was the artificial-language test.

As an interesting sidelight, it may be noted that the entertainment furnished by the subjects' written remarks concerning the artificial-language tests partially compensated for the drudgery of scoring them. The reactions ranged from curbstone vernacular to statements with a touch of the rhythmic and poetic. Some objected to the test's injecting disturbance into their tranquil and peaceful lives. Teachers, certainly the last persons one would expect not to do their best or to indulge in bur-

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lesque in a test situation, were among those who substituted original responses for those required by the test items. Of all species and varieties of human beings, teachers are probably the most docile; yet even they resented the newness of the test situation.

Turning away from a new or difficult situation is probably more characteristic of adults than of children. Children experience new situations much more often than adults; they take them as a matter of course and "wade" into them. Adults are more likely to be routinized by old habits and oft-repeated experiences; the old habit feels easy and comfortable, but the complications of the new arouse apprehension. Therefore, adults avoid new and unfamiliar situations, especially if they are difficult.

In general, then, abilities that are used throughout adult experience tend to increase with age, while abilities required by situations that do not come within the scope of adult experience show a definite decline over a range of adult years.

### SOME IMPLICATIONS OF THE DIFFERENTIAL NATURE OF ADULT ABILITIES

What theories can be constructed on the basis of our findings? Can we make any recommendations for adult education? Is there anything adults can do to maintain their mental powers at a reasonably uniform level? Are there any methods for preventing the decline of some mental abilities? These questions must be answered, to some extent at least, theoretically and speculatively. It

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is possible, while remaining reasonably close to the facts, to make certain speculations concerning the growth and decline of mental abilities after maturity.

Adult experiences should be diversified. Instead of playing always the same chords and tunes, we should use all the keys of our intellectual keyboard. If we confine ourselves within a small world, our intellectual development will shape itself accordingly. It is the nature of adults to become routinized within small areas. We continually exercise the same skills and use the same knowledge, and we congeal intellectually in consequence. The refreshing and illuminating effect of varied experiences is lacking; twenty years' experience is merely one year's experience repeated twenty times.

Instead, we should engage in situations that force us to memorize, translate, reason with symbols, evaluate theories, cope with conflicting problems, and integrate knowledge. We should develop the habit of mastering the new and the difficult. We should so order our lives that we will find ourselves constantly in new situations, confronted by novel problems. The necessity for adjustment to such situations will prevent mental ossification, the mind will remain flexible, and the flow of nerve impulses, so to speak, will be shunted over a great variety of neural pathways. Because the nervous system is very complex and has an almost infinite number of elements, forcing it to respond to diverse stimuli is conducive to extensive development.

For example, during some of her vacations a teacher

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should separate herself entirely from her school surroundings in order to avoid the intellectual and spiritual anemia induced by regimentation. She should seek an environment where interests and motives are different from her own, to broaden her outlook. If she travels, she should see not only the show places that create little more than sensations, but she should also inquire, investigate, study, throw herself into new situations which will make her depend upon her resourcefulness and originality.

Likewise, professors should not, as they frequently do, use the same text year after year because it is so much easier to teach the old and familiar than to work up new material. Nor should they merely dust off their old notes and give the same lectures each year. In one university a professor had done this for so long that the college newspaper announced one year that the time had arrived for Professor Blank to tell his story about the red calf. Calves grow with the passing of time, but brains deteriorate when impulses pass over the same neural tracks year after year. If the professor sets aside the old notes, books, and lectures and devotes himself to organizing the old materials in new forms and to adding fresh information, he will maintain his capacities and even unearth new abilities. Though it may not be possible for him to do this as extensively as when he was younger and formulated his first lectures, the process will be comparable in nature if not in extent.

In general, we should abandon our old beaten paths periodically. We should go into uncharted areas and take



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difficult trails; we should follow roads over which we have never traveled before. We should penetrate into that intellectual realm where facts are fresh, and break away from the forces that regiment us into thinking and living narrowly.

Adults have a tendency to avoid situations that require concentration. We seek simple, easy books that require little effort and attention; we do not want to study them, but merely to read them rapidly and flittingly. We choose a reading diet that we do not have to masticate, and consequently it passes through our nervous systems without assimilation. It is like a light drink—pleasant to the taste and slightly exhilarating in its effect, but hardly nourishing. We should profit more, culturally and intellectually, from books requiring careful and, in some instances, painstaking study and concentration than we do from those over which we can skim readily.

If we wish to maintain our adult abilities—in so far as they can be maintained by practice and activity—we must discipline ourselves with intensive and penetrating study and application to new problems. The maintenance of our intellectual powers during adulthood must be bought with mental effort. This can be accomplished by the method of self-coercion, by saying over and over, "I will concentrate with all my mind; I will apply myself; I will solve harder and harder problems." It is a better procedure, however, to undertake projects that make us concentrate with all our might. Intellectual exercise



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should be the means rather than the end; it should be incidental rather than central.

Above all, we must avoid developing emotional attitudes that cause us to evade problems and difficult situations. It is the American practice to attach a name or label with derogatory connotations to certain principles, theories, and ideas. We eschew them because, as the behaviorist would say, we are conditioned against them. Instead of reacting negatively, we should probe doubtful principles and theories in order to test their worth and validity.

We should not close our minds to any vital problem or question. Controversial issues should be thrown into the arena for analysis, discussion, and investigation. The searching lights of facts, logic, and scientific experiment should reveal what is sound and destroy error and stamp out failure. We should gain socially and economically by this process; our intellectual vitality and integrity would remain to conserve our gains.

The decline of mental abilities with advancing age suggests the general barrenness of adult intellectual life. It indicates that use of the mind is very limited in post-school days. Adults fall into routine habits or are regimented to such an extent that their need or desire for rigorous mental activity is destroyed. The research on adult abilities indicates above all else the need of adults for continuous and sustained learning.

The mind must be exercised both extensively and intensively to develop or maintain its intellectual powers.

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Healthy organisms, including the mind, do not develop through dormancy and apathy; they must be exercised to the maximum degree. Adults should therefore build for themselves an intellectual life that will keep their abilities at the level of their capacities. The measured decline in abilities represents a great loss that ought to be prevented.

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